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MARCH, 1923

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CONTENTS

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Volume 6 Number 5

CLINIC OF DR. LOUIS M. WARFIELD

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HODGKIN'S DISEASE OF THE MEDIASTINAL GLANDS AND LYMPHOSARCOMA

THERE is still some difference of opinion concerning the classification of a large group of diseases characterized by enlargement of the lymph-glands, with or without changes in the blood, and with or without enlargement of the spleen. There is, further, considerable difference of opinion regarding the question of the cause or causes of this group. Some would separate Hodgkin's disease as a distinct entity; others regard it as one of the group. Some view certain of the lymph-gland tumors as malignant; others believe that they belong to the class of infectious granulomata.

Several years ago there was a violent controversy between Sternberg and his followers, who believed that Hodgkin's disease was a form of tuberculosis, and others who held that the two diseases might be associated, but that Hodgkin's disease was an entity having no relation to tuberculosis. At the present time the evidence all goes to prove that the latter view is the correct one.

It is convenient to divide the group, about which I am speaking, into Hodgkin's disease, chronic lymphocytic leukemia and aleukemia, chronic lymphoblastic leukemia and aleukemia, Mikulicz's disease, lymphosarcoma. In this I follow Bunting's classification and accept the close relationship of the diseases placed in this grouping.

All these diseases are characterized by enlargement of the

lymph-glands somewhere in the body. At times the superficial glands only are affected; at times only the mediastinal glands, the retroperitoneal and mediastinal glands, or all the glands in the body.

On one end of the scale is Hodgkin's disease, a disease of young adults primarily, although cases are seen as late as the sixth decade. The great majority of cases occur between the ages of twenty and thirty-five. At the other end is lymphosarcoma, a disease occurring more often after thirty-five, but yet found at all ages. If we admit the possibility of a bacterium as the cause of all these diseases, then we may look upon the differences in reaction of young or old lymph-gland tissue to the virus as the reason for the different kinds of response. In youth the lymphatic tissue is abundant and reaction of this tissue to irritants expresses itself in changes either destructive or hyperplastic—usually hyperplastic—where all the elements of the gland take part. Later in life the same irritant may cause hyperplasia of only the actual lymph elements of the tissue.

The point at which there is an overflow and lymph-cells enter the blood in large numbers is quite obscure. Sections of glands from lymphocytic aleukemia (sometimes called pseudoleukemia) are no different from those of leukemia, and sections of glands of lymphosarcoma may be differentiated from those of aleukemia, but at times it is quite impossible. From the typical, easily recognized Hodgkin's gland to the more or less easily recognized lymphosarcoma gland there are many gradations and atypical forms. These facts suggest strongly the close relationship of this group of diseases.

It is characteristic of malignant disease of the lymph-glands, sarcoma of the glands, that the capsules are broken through and surrounding tissue is invaded. On this account some have thought that Hodgkin's disease was malignant, because, not infrequently, in rapidly growing glands the capsules are broken and tissue is apparently invaded, but the difference is qualitative, not quantitative. The growth in Hodgkin's disease is not truly invasive; it mechanically crowds surrounding tissue and pushes it aside and there are no true metastases to distant organs.

Hodgkin's disease may be acute or chronic. The usual history is a painless swelling on one side of the neck, sometimes preceded by a period of malaise much like that due to early tuberculosis. At other times there is no change whatever in the health of the patient. The growth enlarges painlessly, the neighboring axillary glands become involved, the other side of the neck, the corresponding axilla. The gland enlargement may go to no other groups, but often the inguinal glands become enlarged and the spleen enlarges. The glands usually remain discrete and do not become adherent to the skin, but they occasionally do become so matted together, as a result of frequent exacerbations of periadenitis, that they seem to be one nodular mass and, rarely, they become adherent to the skin. As the disease progresses there is fever, loss of weight, anemia, loss of strength, and of appetite. The fever is of three main types: (1) slight continuous fever, the variations being only a degree and a half. This may be present for months. (2) Fever characterized by a high irregular temperature, with morning remissions which do not reach normal. This form is usually seen in the late stages and may be accompanied by chills and sweats and leukocytosis, so that suppuration is suspected. (3) A relapsing form of temperature characterized by alternating periods of fever and of normal temperature. Periods of pyrexia and distinct malaise alternate at intervals of days or weeks with periods of apyrexia during which the patient feels fairly well, gains in weight and strength. Patients themselves note that the onset of a period of pyrexia is coincident with swelling of the glands. It is during these periods of swelling that the marked periadenitis occurs, with edema, which, upon recession, mats together the groups of glands. This last type of fever is known as the Pell-Ebstein paroxysms.

The natural, untreated course of the disease is progressively downward to death within three or four years.

Many glands are found to be completely fibrosed, others partially fibrosed, with lymph-cells large and small, an occasional giant cell and, often, many eosinophils. Other glands show more or less characteristic pictures: the architecture of the gland is

destroyed, many connective-tissue fibrils and strands are seen, among which are various kinds of mononuclear cells, large and small, and giant cells of two types—one with vesicular nuclei, the other with more solid nuclei. There are varying numbers of eosinophilic polymorphonuclear leukocytes.

Acute Hodgkin's runs its course in a few months and may be most difficult to diagnose.

Case I.—On November 23, 1915 a white blacksmith, single man, was admitted to the Milwaukee County Hospital complaining of pain in the right and left hip, right knee, lower back, and left side of the chest; he also complained that he was easily fatigued. His father died of "quick consumption"; otherwise the family history was negative.

His health had been poor for fifteen years and yet he had been able to do his work, although he always had difficulty in straightening up after stooping over. Years before he had had a rather severe attack of typhoid fever. His right eye was sightless, the result of an injury. About nine years ago he had discharge from the ear for a short time. He had at least three attacks of gonorrhea, which had left him with a slight stricture. About ten years before he had a sore on his penis and the glands of the left groin were enlarged. He had no rash or other secondary manifestations. He had, however, been given antisyphilitic treatment, nature unknown. He had hemorrhoids, which were operated upon about three years before.

He had been rather a heavy drinker of whisky up to about ten years before admission. His appetite and digestion were good, his bowels were regular, there was some nocturia. His weight averaged 170 pounds. He had gradually lost about 10 pounds. It was difficult to get his history. His mind seemed to wander and he made contradictory statements as to dates of illness and illness itself.

His present complaint had no definiteness. There were the pains in his joints, which he said were worse in damp weather. His knee-joints creaked and felt stiff. He had become rather short of breath recently, but there was no cough or edema.

Physical examination revealed a rather well-developed and well-nourished man of middle age. The left pupil reacted normally; there was a corneal opacity in the right eye. The teeth were dirty, but in fair condition; the tongue was slightly coated and protruded without tremor in the midline. Except for feeble breath sounds the lungs were negative. There was some deformity of the bony chest, with scoliosis to the right. The heart was normal. The knee-jerks were exaggerated. There was no Babinski reflex. There was slight deformity of the left leg at the hip, eversion of the foot and 3 cm. of shortening. Sensation was normal.

The urine was normal. The Wassermann reaction was negative. The leukocytes were 8000. The blood-pressure was 95/65, the pulse-rate was 60. The hemoglobin was 60 per cent. (Tallqvist scale), and the differential count was normal. He remained on the ward until January 18, 1916. At no time was there fever. He proved to be a good and willing helper, so he was kept in the hospital. He was finally transferred to the almshouse on the above date, with no diagnosis made.

On August 9, 1920 he returned to the hospital, then forty-nine years old, with the complaint of general weakness. His mental state was apathetic, almost lethargic. At times he babbled incoherently; again he was quite rational, but answered questions slowly and apparently with some mental effort. The physical examination revealed no marked abnormalities not found on the previous admission. His mental state was the most striking feature. The temperature was subnormal, the pulse variable, from 50 to 94 beats per minute. Spinal fluid, 20 c.c., was withdrawn under no pressure. It was clear, 11 cells, no globulin, Wassermann negative.

On the 11th I made note that the patient lay quietly in bed. The left foot was everted as on the former examination. Slow, somewhat thickened speech; very apathetic, although he responded to questions. Slight ptosis of the right eyelid. The left pupil reacted normally. The right was irregular and fixed by synechia. The tongue protruded in the midline. He had a somewhat mask-like expression. All cranial nerves appeared

intact. There was inco-ordination of the arms. The pulse was slow and regular, no retraction of the neck, no myoclonic contractions.

The blood-pressure was 76/50. The blood-count: Red blood-cells 3,900,000; white blood-cells 5800; hemoglobin 60 per cent.

The urine showed a trace of albumin and some pus-cells. Rectal examination revealed nothing abnormal. Cystoscopic examination revealed trabeculation of the bladder, suggesting tabes. An attending neurologist who saw the patient considered him to have an exhaustion psychosis.

By the 22d he was up, and had developed a most ravenous appetite. The provisional diagnosis of exhaustion psychosis seemed to be more probable than any other. The Wassermann reaction was again negative.

From admission to August 28th, a period of over two weeks, the temperature was normal or subnormal. The temperature then began to rise in a step-like manner and became remittent, with daily variations from 103° to 98.8° F. The pulse was never above 104. His sensorium was distinctly clearer and he seemed quite comfortable. The leukocytes continued below 7000. The pulse was compressible and had a decided tendency to dicrotism. He continued to eat enough for two.

On September 3d the spleen was just palpable and the case suggested typhoid fever. There was noted bronchial breathing over the manubrium by the member of the attending staff, but no dulness was mentioned in the notes. Three days later I noted that there was definite dulness beneath the upper sternum extending farther to the right than to the left, and that there was definite tubular breathing over the manubrium. A blood-culture was negative and a Widal reaction was reported positive, although there was stated to be "almost complete clumping and slightly persistent motility."

He developed jaundice and tenderness over the gall-bladder with slight tenseness of the upper right rectus muscle. From the duodenal contents both Bacillus typhosus and B. paracolon were cultivated. The leukocytes continued between 6000 and

7000. The differential count was: Polys. 80.1 per cent., lymphocytes (large and small) 12.4 per cent., transitionals 7.5 per cent., no eosinophils in 250 cells counted.

Certain features of the case suggested typhoid, and yet the temperature chart and general appearance of the patient did not correspond to that diagnosis.

Further, he developed jaundice, and it seemed that, in view of the gall-bladder findings, a cholecystitis caused by the typhoid bacillus might be responsible for his illness. However, one could not but feel that it probably was some illness due to a glandular disturbance situated primarily in the mediastinum, and so a chest *x*-ray picture was made. The plate was poor, as he did not remain quiet, but there *was* definite evidence of a large mediastinal shadow. The lungs seemed negative; the diaphragm was smooth.

He gradually grew weaker, fell into a comatose state, and died October 10, 1920, with a diagnosis of some glandular disease, possibly Hodgkin's disease.

The report of the autopsy performed the same day by the hospital pathologist, Dr. A. G. Margot, is as follows:

Body.—The body is that of a fairly well-developed and somewhat emaciated white male, 164 cm. in length. There is a marked subcutaneous edema, particularly of the lower extremities, and edema of subcutaneous tissue over the anterior portion of the chest. The pupils measure 7 mm. in diameter and are equal. There is a yellow tinge to the whole skin.

Thorax.—The sternum and costal cartilages were removed without difficulty and were not adherent to the subjacent tissues. The diaphragm is at the fifth interspace on each side. In the left pleural cavity are a number of old adhesions; no excess of fluid. In the right pleural cavity are many old fibrous adhesions. The mediastinum is occupied by a large mass of new tissue, which extends into the right pleural cavity. This mass of tissue roughly measures 150 mm. in length by 75 mm. in width and thickness. It invades and compresses the lung tissue on the right side. The large, hard, yellowish-gray mass extends firmly around the trachea and bronchi and invades the neighboring

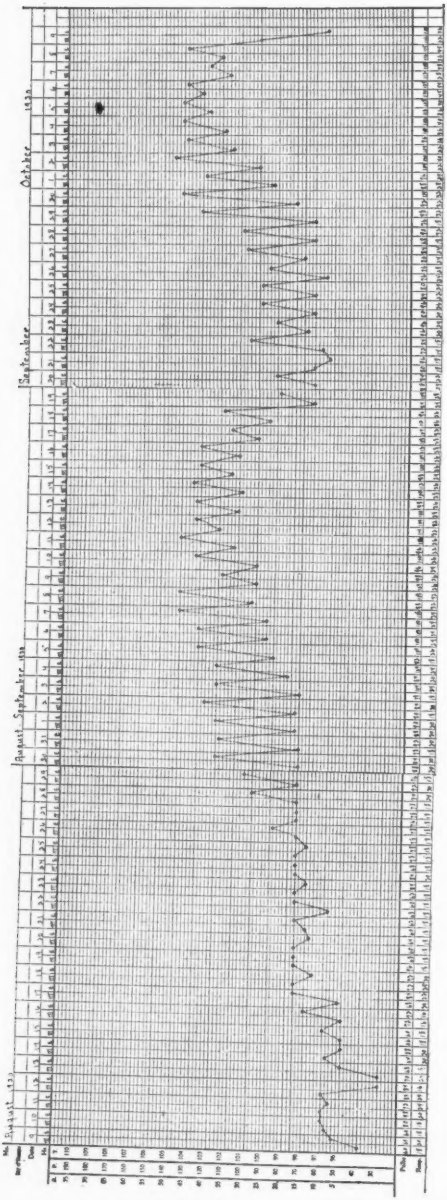

Fig. 159.—Temperature chart of Case I.

lymph-nodes, which are enormously enlarged, firm, and hard. On gross section these enlarged nodes present a light yellowish-gray color and the larger ones often have *extensive, soft, necrotic centers*. These nodes vary in size from about 5 mm. in the posterior mediastinum to the very large mass of new tissue in the anterior part of the chest. Cervical and axillary lymph-nodes are not enlarged. The pericardium contains a slight excess amount of clear serous fluid.

Heart.—The heart is small; its musculature is soft and flabby; leaflets and cusps of all the valves appear normal. The aorta appears normal.

Lungs.—About one-fifth of the right lung anteriorly and medially is replaced, or at least its position is occupied, by a great bulk of tissue having the chracteristics of the growth described under the thoracic lymph-nodes. The left lung everywhere feels soft and crepitant and shows a considerable degree of anthracosis.

Abdomen.—Abdominal fat is essentially lacking. There are about 600 c.c. of slightly turbid fluid in the peritoneal cavity, but the serious surfaces appear normal. From the posterior attachment of the diaphragm downward the retroperitoneal nodes, including the iliac nodes, form a more or less fused irregular mass. The individual masses of new growth vary in size from 10 to 100 mm. in their greatest diameters.

Spleen.—The spleen is very much enlarged and has the usual slatey purple color. Showing through the dark color of the organ are seen here and there yellowish nodules. On section the bulk of the splenic pulp is of dark reddish-brown color. In it are seen many yellowish nodules varying in size from 1 to 15 mm.

Liver.—The liver is enlarged, the capsule smooth, is a reddish color, and is firmer than normal. On cut section the lobules are swollen and indistinct and the surface has a ground-glass appearance. It is quite friable.

Gall-bladder.—Contains about 30 c.c. of mucopus and bile; the wall is edematous and inflamed.

Pancreas.—Appears normal, with the exception of the ter-

minal portion of the tail. In this end, for nearly one-third or quarter of the organ, are found hard, oval nodules varying in size. These masses resemble those found in the various lymph-nodes.

Alimentary canal shows no abnormalities visible externally.

Kidneys.—The kidneys are equal in size, the capsule strips easily, and on the external surface are noted several irregular

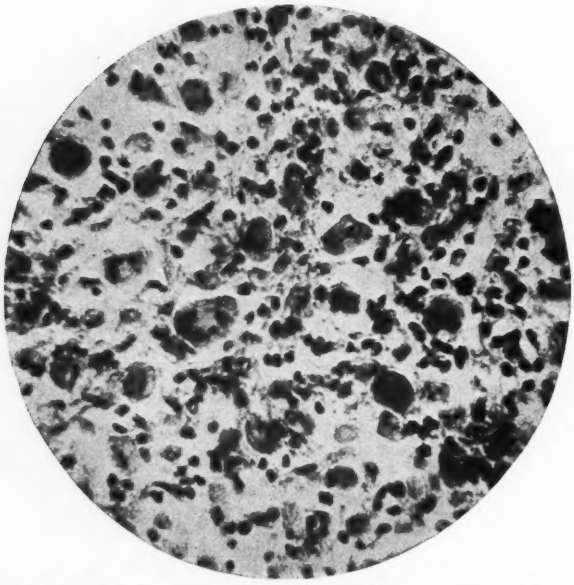

Fig. 160.—Mediastinal tumor showing characteristic changes of Hodgkin's disease. (×450.)

areas which extend into the cortex. The blood-vessels are well defined in them. On cut section the organs are firm, the cortex is thickened, streaked, with scarcely visible glomeruli. The cortex has a typical boiled appearance. The pelves of both kidneys are congested. There is noted in the left kidney a small area suggesting lymphoid infiltration.

Anatomic Diagnosis.—1. Hyperplasia of the tissue of the anterior mediastinal space.

2. General hyperplasia of the mesenteric, retroperitoneal, and iliac chain of lymph-glands.

3. Extension of mediastinal neoplastic growth into the right lung, with involvement of the bronchial and mediastinal nodes.

4. Lymphoid infiltration of the left kidney.

5. Lymphoblastic infiltration of the spleen.

6. Parenchymatous degeneration of all the organs.

7. Empyema of the gall-bladder.

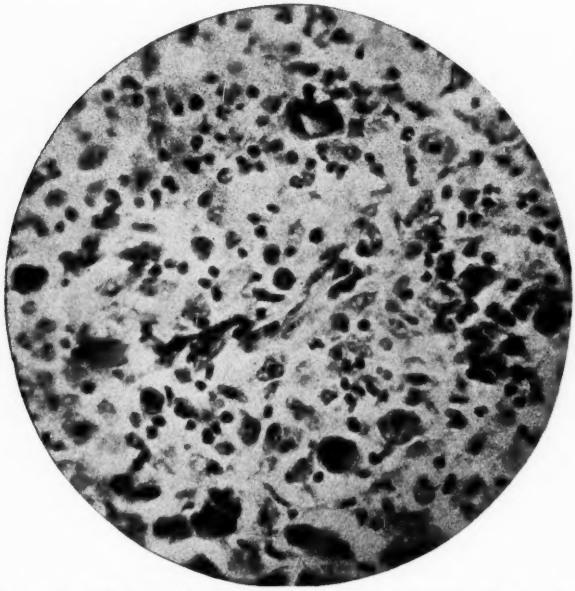

Fig. 161.—A portal space in the liver. Note how the structure of the space has been completely changed by the process. (×450.)

Sections of the tissues from the mediastinum and from several lymph-nodes showed a complete destruction of the architecture of the lymph tissue (Fig. 160). There were strands of connective tissue enclosing in the meshes cells of various sizes with single nuclei, some resembling lymphocytes, others vesicular cells, and numerous large, irregular cells containing several vesicular nuclei. Another type of large cell was seen, with more deeply

stained protoplasm and several solid, deeply stained nuclei. A few eosinophil cells were seen here and there. Scattered throughout were areas of necrosis where all the elements stained a diffuse pink with eosin. Wherever there was a collection of lymph tissue it was the seat of profound change in structure. The small lymph-cell had practically vanished and in its place were large mononuclear cells, giant-cells, and young fibrils of

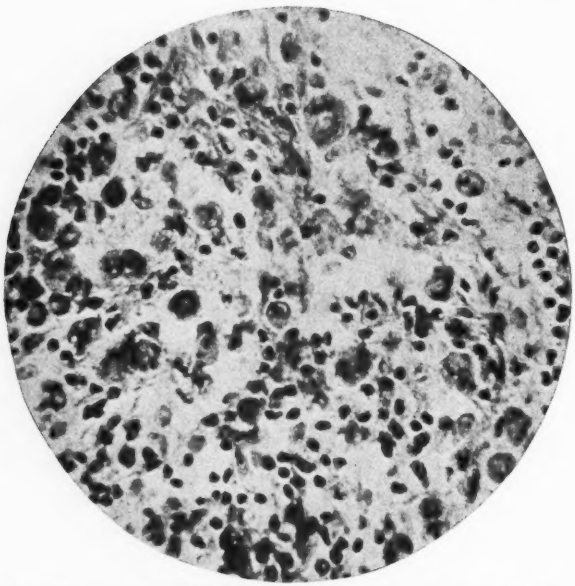

Fig. 162.—Changes in a malpighian corpuscle of the spleen showing how the lesions affect the lymph tissue. (×450.)

connective tissue. Every portal space in the liver which was examined was a typical Hodgkin's nodule (Fig. 161). The malpighian bodies of the spleen also were replaced by the granulomatous tissue (Figs. 162, 163). Here and there in the kidneys the lymph-gland collections were replaced by the new cells. The mesenteric glands revealed changes similar to those in the mediastinal glands (Fig. 164).

All the cells of all the organs showed the characteristic changes

of parenchymatous degeneration. A glance at the figures will show that the histologic picture of the granulomatous tissue is typical of Hodgkin's disease as described years ago by Dorothy Reed.

Cultures from the neoplastic growth in the mediastinum were made by placing sterile pieces of the growth upon Dorset's egg medium and upon all ordinary egg media and incubated at 37.5° C. On the egg medium a small Gram-negative bacillus,

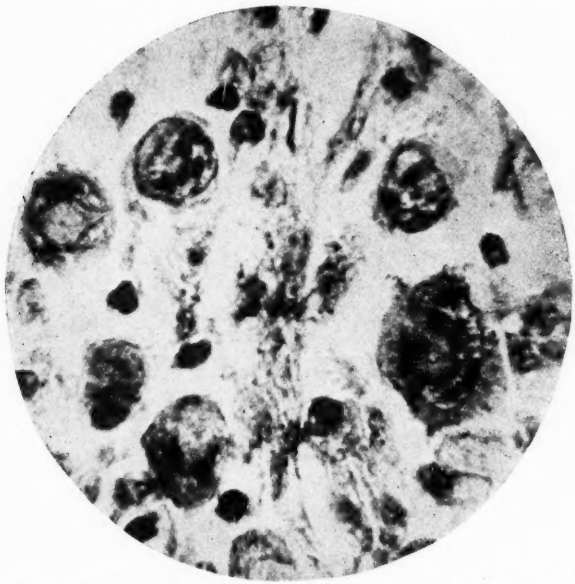

Fig. 163.—Cells of the spleen more highly magnified. (×1400.)

straight and coccoid in form, grew. Repeated cultivation of the bacterium showed tendency in the subcultures to the production of involution forms. There was a marked decrease in protein nitrogen in meat infusion media. Little change was noticed in the amino-nitrogen fraction, but there was formed a soluble proteolytic enzyme in plain gelatin. It fermented glucose and saccharose, with production of gas. Lactose and mannose were unaffected. Cultures from the mesenteric glands showed no

growth. No organisms could be demonstrated in sections of the tissue stained with Weigert-Gram stain.

It is not possible to say to what group the organism found belongs. It may have been a contamination. It was impossible to study it as thoroughly as it should have been studied. Every effort was made to isolate the Corynebacterium hodgkinii, which has been found constantly by Bunting in cases of Hodgkin's

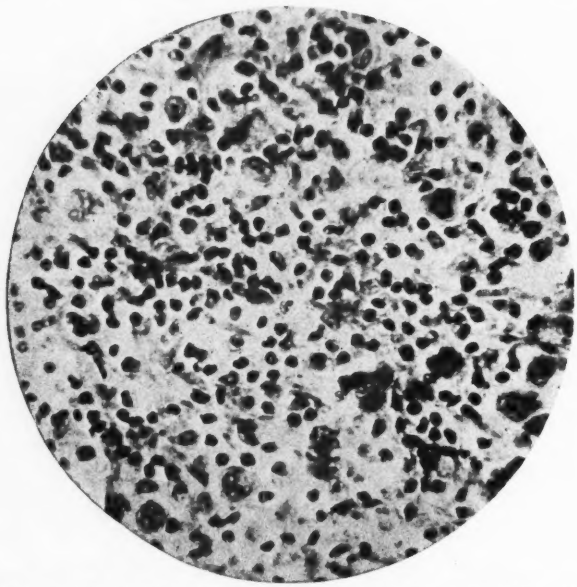

Fig. 164.—Small gland in the mesentery showing complete destruction of normal architecture of the lymph-gland. (×450.)

disease. The technic may have been faulty. Possibly this organism, with its diplobacilli and coccoid forms, may have been one of the phases in the cycle of a diphtheroid.

This case, then, presented some unusual features, both clinically and pathologically. The diagnosis presented difficulties due to the similarity of the disease to typhoid fever in the step-like rise of fever, the slow dicrotic pulse, the gradual enlargement of the spleen, and the low leukocyte count. When to this were

added the laboratory findings of a most suggestive Widal reaction during the first week of the fever, and the culture of Bacillus typhosus from the duodenal contents, it seemed almost certain that the patient had typhoid fever. The jaundice and the tenderness over the gall-bladder are not infrequent complications of typhoid fever, so that one would have been justified, from both clinical and laboratory findings, to diagnose typhoid fever. However, there is a curious general appearance of a patient who has typhoid fever which this man did not have, and a careful examination of the upper chest revealed both definite dulness over the manubrium and tubular breath sounds, both signs of some tumor mass in the anterior mediastinum. Confirmation was given to the diagnosis of tumor by the *x*-ray plate in spite of the unsatisfactory film, so that we felt that in spite of the great similarity to typhoid fever, it was not that disease, but most probably acute Hodgkin's disease of the mediastinum. There was no superficial gland which we could remove for examination, and the abdomen of the patient was so tense that we could not feel the retroperitoneal glands.

Pathologically, the most striking feature of the growth was the wide-spread necrosis in the interior. This is of interest in connection with one of Bunting's monkeys, which after inoculation with a virulent strain of Bacillus hodgkinii obtained from a human case of Hodgkin's disease, died within three months, and at autopsy the enlarged glands revealed wide-spread necrosis.

Case II.—In contrast to this acute case is a woman of thirty-nine, now in the University Hospital, who was admitted August 28, 1922, complaining of difficulty in breathing through her nose, pain in the left side, chest, and back, shortness of breath, weakness, and hacking cough.

The family history was negative.

A year and a half ago she entered the hospital with a swelling on the left side of the neck against the inner end of the clavicle. This swelling was about 6 cm. in diameter, smooth, and hard. She was thought to have sarcoma of the clavicle and *x*-ray

treatments were given. The swelling rapidly disappeared and she left the hospital apparently recovered. She was seemingly in her usual health until five weeks before admission, when she noticed swelling of the left arm and left breast, stabbing pain in the back and chest, and the other symptoms mentioned above. Besides these she also had nausea and vomiting.

On physical examination she appeared ill. She was somewhat emaciated and cachectic looking. The teeth were in bad condition, both pyorrhea and caries. The pupils were normal. On the left side of the neck, in the posterior triangle, was a slight diffuse swelling made up of several hard, elastic nodules, separated from one another, and measuring from $\frac{1}{2}$ to $1\frac{1}{2}$ cm. in diameter. There was no tenderness, no redness of the skin, the skin was not adherent to the glands. In the enlarged left breast were several firm, painless masses. The left clavicle was perfectly smooth throughout. The left arm was slightly larger than the right, and over the upper chest were visible enlarged veins. The right chest was hyperresonant on percussion, but clear on auscultation. The left chest was immobile and flat except above the clavicle. The breath sounds were absent in the lower half and harsh over the upper half. There were dulness and tubular breath sounds over the anterior mediastinum. The heart was moved to the right, the apex-beat was not seen or felt, and the most visible pulsation and loudest heart tones were seen and heard at the ensiform. The abdomen was negative, the inguinal glands were enlarged, the lower extremities were not edematous, and the reflexes were normal.

The urine was negative, the Wassermann reaction was negative. The blood-pressure was 108/80; the N. P. N. was 30 mg. per 100 c.c. of blood. Blood-counts were as follows:

August 30th: Red blood-cells, 4,150,000; white blood-cells, 12,000; hemoglobin, 73 per cent. (Sahli). Differential count: Polymorphonuclears, 66 per cent.; small lymphocytes, 19 per cent.; large lymphocytes, 6 per cent.; large mononuclears, 5 per cent.; eosinophils, 4 per cent. The red cells were normal.

September 26th: White blood-cells, 10,700. Differential count: Polymorphonuclears, 69 per cent.; small lymphocytes, 16 per

cent.; large lymphocytes, 6 per cent.; large mononuclears, 5 per cent.; eosinophils, 4 per cent.

October 1st: Red blood-cells, 3,700,000; white blood-cells, 9000; hemoglobin, 65 per cent. Differential count: Polymorphonuclears, 66 per cent.; small lymphocytes, 22 per cent.; large lymphocytes, 8 per cent.; large mononuclears, 3 per cent.; eosinophils, 1 per cent.

In order to relieve her respiratory distress 1500 c.c. of a cloudy yellow fluid were withdrawn from the left chest. This had a specific gravity of 1.020 and albumin content of 27 per cent. Air was introduced in order to obtain an *x*-ray picture. The plate revealed dense shadows up to the seventh rib posteriorly on the left side and a thickened pleura along the lateral chest wall from the apex. The posterior mediastinum appeared to be filled with dense irregular shadows well outlined.

The pathologist's report of a small gland removed from the neck "showed evidence of a slow chronic infectious process." An *x*-ray plate of the left clavicle was quite normal.

The course has been steadily downward. There has been little or no fever. The mass in the mediastinum is extending toward the left and the patient is experiencing more and more difficulty in breathing. *x*-Ray treatments have been of no help. This case, in our opinion, belongs to the group of lymphosarcomata, although we are not sure that there may not be areas in the glands which could be called atypical Hodgkin's disease. The age of the patient, the rapid subsidence of the first gland under *x*-ray treatment, the extensive growth with no fever and with a decreasing leukocyte count, speak more for the type lymphosarcoma.

That these groups may all be found in one individual is shown by several of Bunting and Yates' cases, and by a case I reported several years ago of lymphosarcoma in one gland, atypical Hodgkin's disease in another, and terminal lymphocytic leukemia.

Attention should be called to swelling in the left axilla or swelling of the left arm, as often the first signs of mediastinal growth which is usually of glandular nature. I have seen only

the left arm enlarged, due to the fact that the left subclavian crosses the mediastinum in order to reach the right and form the superior vena cava.

Pleural effusion is not uncommon. The pleura is enormously thickened and nodules of glandular hyperplasia may be scattered over it. The fluid is both transudate and exudate. I have seen fluid in both typical Hodgkin's disease and lymphosarcoma of the mediastinal glands.

Fig. 165.—Lymph-gland from the mesentery, showing (above) the fat in the mesentery; beneath this, small round cells; below this, the larger irregular lymphoid cells of the tumor. (Low power.)

Rarely are the mediastinal glands involved without corresponding enlargement of the retroperitoneal chains, but the converse is frequently the case.

Case III.—A man of forty-five years, who was recently at the University Hospital, illustrates this point. He came in complaining of pain in the abdomen, chest, and joints; loss of weight and swelling of the glands. He noticed the glandular swelling

in the inguinal region only three months before he entered the hospital. On examination all the superficial glands were enlarged and the spleen was palpable. A gland was examined and diagnosed as "malignant neoplasm of the round-celled type."

At autopsy there was a huge mass of glands primary in the mesenteric and retroperitoneal lymph-nodes completely surrounding the aorta and extending along the iliac vessels. In the enlarged spleen were nodules in both lungs and small nodules

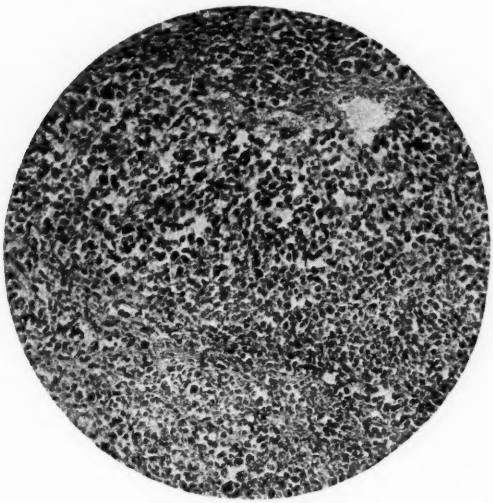

Fig. 166.—Showing considerable stroma, with dilated capillaries and great irregularity in the size of the cells. (Low power.)

were in the liver. The pathologic diagnosis was lymphosarcoma of the large round-celled type (Figs. 165–168).

The cases are not easily differentiated even after a gland has been removed. Bunting believes that in the early stages of Hodgkin's disease there is a characteristic blood-picture. The chief features are in the differential count and consist of increase in the transitional forms and increase in size and number of platelets. The lymphocytes are not much changed, the basophils may be increased. Later, there is leukocytosis, with poly-

morphonuclear increase and reduced lymphocytes. This last cell seems to be of value in prognosis, rising as the remission takes place and falling during the exacerbation.

Just a word as to treatment. In a disease where there is a progressive course and a mortality of 100 per cent. there seems little to accomplish by any method of treatment. Various drugs have been used, but without success. They assist at times in alleviating some of the symptoms. When the process has attacked the mediastinal glands it is analogous to the cancer of

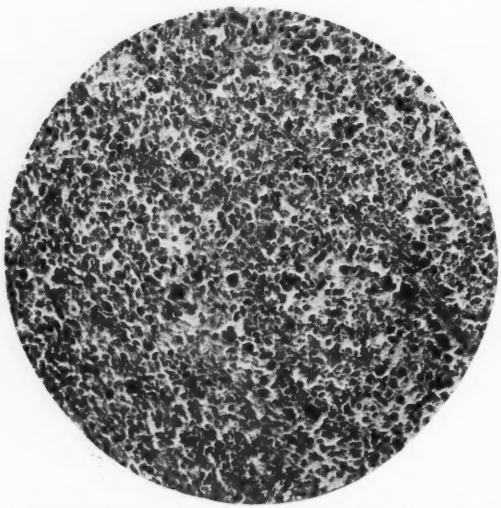

Fig. 167.—Another portion of the tumor, showing how irregular in size the cells are, and also showing giant-cells. (Low power.)

the stomach large enough to give an easily palpable tumor. Nothing has helped. *x*-Ray and radium have been conscientiously tried, but have been of no avail. Something can be done for the earlier stages of Hodgkin's disease, at least.

If the disease is viewed as a bacterial toxemia in which the struggle is one between toxin and body forces, the logical procedures would be to destroy the exciting cause and to build up the bodily resistance. Obviously, this can best be done in the stage when the bacterial toxin has not overwhelmed the body

and the bodily resistance is still at a relatively high level. This means early diagnosis, the recognition of the disease while it is still in its beginning. Diagnosis by the removal of a gland is quite certain. Examination of blood-smears has enabled Bunting to make early diagnoses. This latter simple procedure has not been generally accepted as possible. The first procedure is universally accepted.

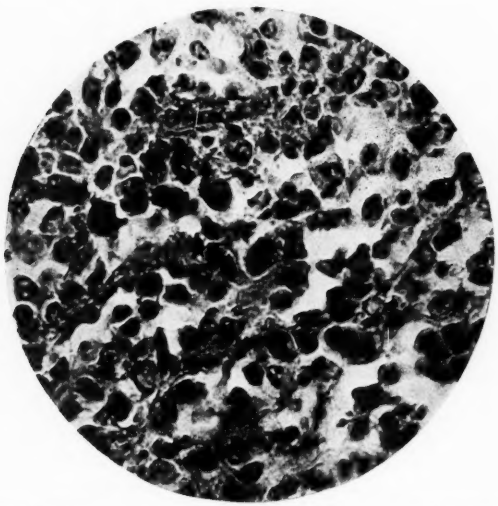

Fig. 168.—Showing the cells more in detail. The majority are of the large lymphocyte form, although the variation is great and some cells approach the giant-cell type. (High power.)

Granting an early diagnosis, the principles of treatment outlined by Yates have resulted in at least 10 per cent. of cures based upon the criteria of the living and symptomless patient six years or more from the time of diagnosis. Bearing in mind the possibilities of a local point of infection, and the fact that the disease so frequently begins in the glands of the neck, the first move is radical tonsillectomy. All other foci of infection are removed not because they may be portals of entry only but because every factor which may have any influence in reducing the patient's general resistance is best removed. Next, the most

prominent glands are dissected out as would be done for cancer metastases. The internal jugular may have to be removed. Yates calls particular attention to a gland behind the sterno-clavicular joint at the angle formed by the junction of the internal jugular and subclavian veins. This may be most difficult to remove, but it should never be left. It is one of the connecting glands between the neck chain and the mediastinal glands. The wound is swabbed with tincture of iodin and a drain left in. The same day, or at latest the next day, the part is subjected to deep *x*-ray or radium therapy. The radiotherapy is controlled by one who is expert in the treatment. Later, other glands which may be prominent are also rayed. By these means it is hoped to place the balance of power in the body. All accessory hygienic procedures are to be carried out. The course is controlled by blood-smears. As long as the lymphocytes remain high the case is supposed to be favorably progressing.

Thus, a combination of internist, pathologist, hematologist, otolaryngologist, surgeon, and *x*-ray therapeutist is essential for the proper handling of such cases as are diagnosed Hodgkin's disease. Hope for cure lies in early diagnosis, earlier than we now diagnose the cases.

For lymphosarcoma the same may be said anent early diagnosis. If the largest group of glands can be removed, it should be. So far, our best remedy is the *x*-ray or radium. Thus far it is not known what the best method or dosage is, but as time goes on, we shall undoubtedly be enabled to regulate the dosage and intervals so that the best results may be obtained in the treatment of a usually fatal disease.

CLINIC OF DR. L. H. NEWBURGH

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CASES ILLUSTRATING THE USE OF A HIGH FAT DIET IN THE TREATMENT OF DIABETES MELLITUS

MUCH has been written about the advantages of fasting and prolonged undernutrition in the treatment of diabetes mellitus. The advocates of this method were convinced that the use of fasting afforded the best means of freeing the patient of sugar, and of causing an acidosis if present, to disappear. They considered prolonged undernutrition, varying with the severity of the case, the best method of keeping the patient sugar free, of avoiding acidosis, and of preventing further progression of the disease.

While the use of fasting and undernutrition has been attended by a great improvement in the treatment of diabetes, especially in its severer forms, certain theoretic considerations suggest that moderate restriction of calories during the period of desugarization will accomplish as much as complete fasting, and that a maintenance diet will be just as capable of keeping the patient sugar free and of preventing or delaying downward progress as will undernutrition. Since fasting and prolonged undernutrition inevitably lead to incapacity, it is eminently worth while to determine by actual trial whether a dietetic régimen that allows sufficient calories to avoid this evil will control the disease itself as effectively as the more rigorous plan. In order to supply more calories without increasing the glucose equivalent of the diet, it is necessary to feed the patient a diet relatively much higher in fat and poorer in protein than has been customary in the past. The use of such high fat diets can be justified only when it has been clearly proved that the additional fat does not increase the liability to acidosis.

I shall now present to you 4 patients' records as evidence that the type of high fat, low protein, low carbohydrate diet which we have to date used in the treatment of more than 200 consecutive cases of diabetes mellitus at the University Hospital, does not only not cause an acidosis, but is attended by its disappearance in those patients who were suffering from an acidosis at entrance.

The first 2 cases are of special interest because they afford an opportunity to compare in the same individual the results obtainable with the method of fasting and undernutrition with the high fat maintenance plan.

Case I.—A Russian housewife, twenty-five years of age, entered the hospital July 13, 1921, complaining of the usual diabetic symptoms. There was no family history of diabetes and her past history was of no importance. In March, 1920 she had a severe attack of cramps in the legs associated with excessive thirst and polyuria. Other symptoms were failing vision, obstinate constipation, and progressive loss of weight. She had no systematic treatment until August 13, 1920, at which time she was fasted for five days and her urine became sugar free. Her diet was increased until she was receiving protein 50 grams, fat 20 grams, carbohydrate 30 grams, about 500 calories, with one fast day each week. From this time until July 1, 1921 she adhered rigidly to this diet, which was prepared by a trained dietitian, with the exception of a short period in January, 1921, when she was allowed one or two slices of bacon a day in addition. At no time during this whole period except on the last day of her initial fast was her urine free from sugar; this treatment was confirmed by her home physician. On July 1, 1921 fasting was again started, and this time four days of complete fasting followed by five days in which she was allowed "a few" 5 per cent. vegetables, failed to render her urine sugar free, and she refused to fast longer. During the few days before she came to us she adhered to the original 500 calory diet.

In February, 1920 she weighed 145 pounds. Examination at the time of admission showed an unusually intelligent woman,

59 inches tall, weighing 100 pounds, with no important abnormalities aside from her laboratory examinations. She was discharged from the hospital on a diet which gave her about 1400 calories daily and she has remained sugar free up to the present time, a period of five months.

Table 1 shows very clearly that this patient who had previously not been made sugar free by prolonged fasting, could be relieved of glycosuria in four days when taking a diet of 900 calories whose energy was derived chiefly from fat. It shows further that she continued to remain sugar free on the same type of diet yielding 1435 calories. She was discharged from the hospital on August 9, 1921 with instructions to adhere strictly to the diet. She continued to live on this diet for more than a year, and except for one short period was always sugar free. The recurrence of glycosuria was occasioned by an infected tooth, extraction of which was quickly followed by a disappearance of sugar from the urine. She told us repeatedly throughout this year that she felt well and that she had sufficient strength to permit her to do light housework and care for her child.

TABLE 1. RECORD FROM CASE I IN WHICH FASTING AND SEVERE UNDERNUTRITION HAD FAILED TO KEEP URINE SUGAR FREE

Date: July, 1921.	Average		Diet		Urine sugar, gm.	Ferric chlorid reaction.	Body weight, lbs.
	Protein gm.	Fat, gm.	Carbohydrate, gm.	Calories.			
13	.....	.....	.....	.....	25.5	++++	100
14	.....	.....	.....	.....	16.3	+++	
15	.....	.....	.....	.....	8.8	+++	
16	20.0	85.8	13.1	905	4.0	++	
17	.....	.....	.....	.....	0	0	99
18	.....	.....	.....	.....	0	0	
19	.....	.....	.....	.....	0	0	
20	.....	.....	.....	.....	0	0	95
21	.....	.....	.....	.....	0	0	
22	.....	.....	.....	.....	0	0	
23	.....	.....	.....	.....	0	0	
24	28.4	137.4	20.8	1435	0	0	
25	.....	.....	.....	.....	0	0	96
26	.....	.....	.....	.....	0	0	
27	.....	.....	.....	.....	0	0	

This very severe diabetic who, on a diet low in fat and yielding 500 calories, continued to have a glycosuria, was kept sugar

free on a diet high in fat which furnished her with almost three times the energy. The 32 calories per kilogram derived from this latter diet was sufficient to maintain her and thus abolish the symptoms of undernutrition from which she had been previously suffering.

Case II.—An American farmer, twenty-eight years of age, entered the hospital March 1, 1921, complaining of the usual diabetic symptoms. There was no family history of diabetes, except that a four-year-old son of the patient has had an occasional glycosuria. There was nothing of importance in his past history. Polyuria, polydipsia, and polyphagia developed in August, 1914, when the patient was twenty-one years old. During the following three months his weight fell from 160 to 113 pounds. Treatment was not started until January, 1915. Four days of complete fasting followed by several days during which he was allowed green vegetables and two or three more days of fasting, a total of ten days, rendered his urine sugar free. He was discharged on a diet which allowed him considerable freedom in the kinds of the food stuffs that he ate, but which was very much restricted in total calories. During the following two years he felt fairly well most of the time, although he had sugar in his urine frequently. Between the spring of 1916 and March, 1921 he was free from sugar at no time in spite of the fact that he was fasted on five occasions for periods of from four to ten days. During the month preceding his admission to our ward he suffered from epigastric distress, "heartburn," and nausea. His symptoms were sufficiently severe to make his home physician suspect peptic ulcer. His vision had failed and he was badly constipated. On examination it was noted that he was decidedly stuporous and went to sleep while his blood was being taken for the laboratory examination. Later he could not remember anything that had happened during the first day he was in the hospital. His breath had a decided acetone odor. His right knee-jerk could be obtained only on reinforcement and his left could not be obtained. His urine contained a trace of albumin, reduced Fehling's solution, and gave a heavy reaction

with ferric chlorid. His blood-sugar was 0.38 per cent. and the CO_2 combining power of the blood plasma by the Van Slyke method was 37 volumes per cent. The day-to-day record of his first three weeks with a summary of the following few weeks in the hospital is presented in Table 2. It will be seen that his urine became sugar free on the twelfth day in the hospital.

TABLE 2. PART OF RECORD OF PATIENT (CASE II) WHO HAD FAILED TO BECOME SUGAR FREE DURING SEVERAL PERIODS OF STARVATION

Date, 1921.	Diet.				Urine.			Blood.		Weight, lbs.
	Protein, gm.	Fat, gm.	Carbohydrate, gm.	Calories.	Amount, c.c.	Glucose, gm.	Diacetic.	Sugar, per cent.	CO_2 vol. per cent.	
3/2	19.1	95.4	14.2	990	1250	43.8	++++	0.38	37	133
3	22.2	69.0	13.4	865	2150	56.6	++++			
4	21.7	94.4	14.8	995	1650	25.1	++			132
5	20.8	89.9	13.4	940	2170	18.1	++			
6	21.2	89.0	13.4	935	1925	17.5	++++	0.27	51	134
7	21.2	89.0	13.4	935	2350	20.2	+++			
8	20.5	92.4	14.6	970	2355	17.5	+++			133
9	19.1	95.4	14.2	990	2100	11.9	+++			134
10	15.3	99.5	11.0	1000	1590	7.8	+++			134
11	14.9	101.0	10.5	1015	1640	5.6	+++			
12	15.2	100.0	11.0	1005	2335	0	+++	....	..	136
13	15.4	100.0	11.3	1005	1760	Tr.	++	0.13	64	
14	15.4	100.0	11.0	1005	1895	0	+++	....	..	134
15	15.4	100.0	11.0	1005	3150	0	+++			
16	15.4	100.1	11.1	1005	2215	0	++	0.13	65	132
17	24.8	149.6	15.2	1505	1565	0	+			
18	26.1	151.1	15.3	1525	4370	0	Tr.	....	..	135
19	25.2	150.7	14.2	1515	3270	0	Tr.			
20	26.1	149.7	14.6	1510	3190	0	0	....		132
21	24.8	149.6	15.2	1505	2200	0	0	....	75	
3/21 to 30	43.0	180.0	15.0	1850	....	0	0	....	66	130
3/31 to 4/4	43.0	200.0	15.0	2030	....	0	0	....	65	
4/5 to 20	43.0	220.0	11.0	2200	....	0	0	....	65	

This second case shows, as did the first one, that a high fat, low protein diet restricted in calories will render a patient sugar free after fasting has failed to do so.

It also brings out another point of great importance, namely, that patients with severe acidosis may be freed of their acidosis as well as their glycosuria by means of such a diet.

The patient, during the year and eight months which have now elapsed since he first came under our care, has continued the diet upon which he was discharged. The 37 calories per kilogram of body weight yielded by the diet, have permitted

him to work hard as an automobile mechanic; and he insists that he has felt strong and well since leaving the hospital in April, 1921. His urine has throughout this period been free from sugar and acetone bodies except for two brief periods when glycosuria was caused by lapses in diet.

The third case is used to demonstrate the safety of a high fat diet for a patient suffering not only from a severe acidosis but also a serious infection.

Case III.—A painter, thirty-four years old, entered the hospital July 7, 1922, in a semicomatose condition. His diabetes came on rather abruptly in December, 1920, in the form of polyphagia, polydipsia, and polyuria. Weakness was marked and progressive. He began treatment for diabetes six weeks later with an initial fast, followed by an irregular dietetic restriction. Three weeks before coming to the hospital he had two teeth extracted. There was an immediate return of sugar in the urine. A week later the dentist incised an abscess of the jaw. A few days of fasting followed by a "green diet" failed to render him sugar free. He then gave up all dietetic limitation. On examination, he was found to be very drowsy. The skin was slightly icteric and pale. His breathing was of the Kussmaul type. A small tumor mass was noted at the angle of the jaw on the right, and the gum in this region was red and swollen. The knee-jerks could not be obtained. A moderate, soft edema was present over the lower legs. His hemoglobin was 60 per cent.; his red blood-corpuscles 3,250,000. He had no leukocytosis or fever. A roentgenologic examination of his jaw revealed a definite osteomyelitis with considerable bony destruction. The day after entrance the oral surgeon removed a sequestrum from the jaw and cureted the cavity.

Table 3 is a record of the laboratory data for the first ten days of treatment in the University Hospital. The plasma CO_2 readings show clearly that the severe acidosis from which the patient was suffering at entrance had disappeared in four days. Of considerable interest is the rapid fall in the blood fat from 7.6 to 1.7 per cent. in nine days in a patient whose diet contains

such a high proportion of fat. All of our diabetic patients who have been treated on the high fat plan and have had a lipemia at entrance have shown a rapid return to normal or nearly normal blood-fat readings. The rapid gain in weight was due to edema.

TABLE 3. PART OF RECORD OF CASE III

Date, 1922.	Diet.				Urine.		Blood.			Weight, lbs.
	Protein, gm.	Fat, gm.	Carbohydrate, gm.	Calories.	Glucose, gm.	Diacetic acid.	Sugar, per cent.	CO_2 vol. per cent.	Fat, per cent.	
7/7	21.7	85.0	12.6	900	50.3	++++	0.53	34	7.6	103
8	21.5	85.8	13.3	910	56.2	++++	....	38	..	100
9	21.0	86.5	13.2	925	29.4	++	....	....	..	101
10	21.5	86.6	14.1	935	41.4	++	....	64	..	108
11	20.4	93.6	13.5	980	17.5	+	....	....	..	115
12	21.3	88.7	13.0	930	11.1	+	....	....	2.8	116
13	20.1	93.7	13.0	975	11.4	0	....	....	..	117
14	21.7	87.1	12.6	920	Trace	0	....	....	..	116
15	21.0	86.6	13.2	910	4.0	0	....	....	..	117
16	21.5	85.8	13.3	910	0	0	0.20	....	1.69	117
17	21.7	84.0	14.1	900	0	0	....	72	..	119

July 19th, after he had been in the hospital twelve days, his diet was increased to about 1250 calories and contained about 24 grams of protein, 120 grams of fat, and 20 grams of carbohydrate. Four days later a further addition brought his calories up to about 1750. From July 29th to August 3d, when he was discharged, he was receiving from 2200 to 2300 calories daily. His diet on July 29th was typical of this period and consisted of 54 grams of protein, 217 grams of fat, and 31 grams of carbohydrate. His urine remained free from sugar and ketone bodies, even though he was receiving nearly 50 calories per kilogram and was deriving about 85 per cent. of his energy from fat.

He continues to adhere to this diet, has returned to his former occupation, and feels well.

Special interest always attaches to the management of diabetes mellitus in young children. The record which follows is a fair sample of our experience in this respect.

Case IV.—A boy four years old (born November 5, 1918) entered the hospital March 6, 1922 with diabetes that had ap-

peared abruptly in June, 1921 with polyuria and polydipsia. His father's brother has diabetes. There was nothing of importance in his past history. The diagnosis of diabetes was made immediately and he was taken into a hospital in his home city for treatment, which was begun with a fast. Little information could be obtained concerning this period of treatment except that after a few days of fasting his condition seemed very serious and his mother states that he was on the verge of coma. He was given food, but the mother does not know the quantities. His diet was gradually increased until he was receiving protein 40 grams, fat 33 grams, carbohydrate 25 grams and 550 calories. On this diet he had constant glycosuria and a heavy ferric chlorid reaction in his urine. During the two months before admission he had not been sugar-free at any time. At the beginning of his illness he weighed 32 pounds and at admission 28 pounds. His physical examination showed nothing of importance. Part of his record is presented in Table 4. It will be noted that his urine became sugar-free on the eleventh day and the ferric chlorid reaction was negative the same time. The gain in body weight during the first few days was probably due to changes in the fluid content of his body. Nitrogen balance was established on a diet containing 30 grams of protein, 75 grams of fat, and 12 grams of carbohydrate, yielding 845 calories. Balance was not obtained from 30 grams of protein and 750 calories. For adult diabetics, $\frac{2}{3}$ gram of protein and 30 to 40 calories per kilogram of body weight are sufficient to maintain nitrogenous equilibrium. In contrast this four-year-old boy needed more than 2 grams of protein and approximately 60 calories per kilogram to establish nitrogen balance.

During the first three months of treatment in the hospital he gained no weight, was listless, and disinclined to play. His calories were then further increased with the hope of adding to his weight and improving his general condition. Since the first of September he has been receiving about 1450 calories daily. This addition to his food has been attended by a gain of 2 pounds in weight, and he now conducts himself like a normal child.

These cases serve to illustrate the chief advantages which

TABLE 4. PART OF RECORD OF A THREE-YEAR-OLD DIABETIC, CASE IV

Date, 1922.	Diet.				Urine.			Weight, lbs.
	Protein, gm.	Fat, gm.	Carbohydrate, gm.	Calories.	Glucose, gm.	Diacetic acid.	Nitrogen, gm.	
3/8*	14.3	45.0	4.9	480	++++	++++	.....	28
9	12.2	41.5	6.6	450	5.4	++++		
10	13.3	44.0	5.7	470	4.1	++++		
11	12.3	43.0	4.8	405	5.4	+++		
12	14.4	47.0	6.4	505	3.0	+++		
13	16.5	57.6	8.2	615	Tr.	++		
14	13.1	59.1	11.3	630	7.3	++		
15	13.0	54.0	3.8	555	5.1	++		
16	13.1	47.1	6.4	501	6.2	+++	..	30.5
17	9.8	40.7	7.2	435	2.3	+++		
18	9.7	40.1	6.4	425	0	0		
19	10.8	43.3	7.5	465	0	0		
20	10.8	43.3	7.1	460	0	0		
21	14.8	46.2	7.1	505	0	0		
22	14.8	46.2	7.1	505	0	0	..	30.5
23	13.2	40.0	7.1	440	0	0		
3/23 to 3/29	20.0	45.0	7.0	515	0	0	.....	29.0
3/30 to 4/5	25.0	55.0	12.0	645	0	0	9.29	29.0
4/6 to 4/9	30.0	55.0	12.0	665	0	0	7.52	30.0
4/10† to 4/12	30.0	65.0	12.0	755	0	0	7.82	30.5
4/13	30.0	75.0	12.0	845	0	0		30.0
4/14		Dietetic	Error	...	3.7	0		
4/15 to 4/19	30.0	55.0	12.0	665	0	0	.....	28.0
4/20 to 5/19	30.0	65.0	12.0	755	0	0	5.21	27.0
5/20 to 6/4	30.0	75.0	12.0	845	0	0	4.48	26.5
6/5 to 6/12	30.0	85.0	17.0	955	0	0	3.87	27.0
6/13 to 6/15	30.0	95.0	17.0	1045	0	0	3.59	27.0

* Blood fat, 1.13 per cent.
† Blood fat, 0.89 per cent.

are to be expected from the use of a high fat diet in the treatment of diabetes mellitus. They show that patients so severe that fasting does not render them aglycosuric may be made sugar-free by feeding them approximately 900 calories daily, chiefly in the form of fat; that patients who enter the hospital in impending coma, lose their acidosis while taking this diet; that diabetics, by means of a diet of this type, may be fed sufficient calories daily (30 to 40 per kilogram) to permit at least considerable, often great physical activity, and thus avoid the incapacity which accompanies undernutrition.

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CASES ILLUSTRATING SOME CONTRAINDICATIONS TO THE INTENSIVE TREATMENT OF SYPHILIS

So much has been said and written of late years about the treatment of syphilis that a further contribution on this subject would, at the moment, be superfluous. Far more important is it, I think, to call to your attention a subject equally as important as the treatment of the syphilitic. I refer to those cases which, to be sure, are not infrequent, in which it is desirable to withhold treatment, and, indeed, occasionaly not to treat at all.

Syphilis as a national problem, interesting not only the medical profession, but the entire laity, dates from the newer conception of the syphilitic pathology, the introduction of the arsenical treatment, and the diagnostic aid of the complement-fixation test.

The active participation of government, of state, and of cities in the control of venereal disease, and the establishment of active social service, particularly in the enforced treatment of syphilitic subjects, have done much to educate the public, and no doubt are of enormous benefit in the control of the disease, and in the study of its ubiquitous manifestations. Without in the slightest wishing to cast reflection upon the state, government, and civic activity in the direction of the control of venereal disease, I think it is only fair to state that certain dangerous factors in connection with treatment have lately appeared, which may directly be attributed to this activity. The syphilitics, for the most part, are now treated in groups. Large institutions have been established; state, federal, and civic clinics have led to what might be termed the "mass treatment" of the patient. This, in its turn, has led to an actual attempt, and a quite natural

one, to standardize treatment. The necessity for such standardization, for laying down absolute rules and a routine, is evident when one considers that the actual treatment is most often found to be in the hands of men without large experience, this, of course, being due to the fact that the stipend is such that it would attract only young men about to embark on a medical career.

The net result has been, and I say it without hesitancy, that there is a fast-growing tendency to treat syphilis and forget the syphilitic, if I may so be permitted to state the case. There is no disease in which greater attention should be paid to the individual with the disease, rather than to the disease itself. It may be admitted that a large majority of those being treated routinely with so many injections of salvarsan, so many weeks or months of mercury, and so much iodid of potash, are unquestionably vastly benefited thereby. On the other hand, many patients without doubt suffer by reason of the fact that such routine should not be applied to their cases. In the latter group the particular manifestations may be such that the treatment of the patient not only involves the treatment of the syphilis, but not infrequently the treatment of an associated disease, of complications such as those of the heart and the liver, the gastrointestinal tract, and the nervous system. Where visceral syphilis exists, such cases may require treatment not only from the side of the syphilis, but from the standpoint of the affected viscus as a dysfunctioning organ.

Being in charge of a large amount of hospitalized syphilitics myself, I am quite certain that I have erred on this side also. It is so easy to fall into a routine, so much time is thereby saved, that one must indeed continually guard against this ever-present danger.

I am frequently asked by students and practitioners: "How do you treat syphilis?" Occasionally even: "What is your routine treatment for syphilis?" To both questions there is only one answer: that syphilis cannot be treated in a routine fashion. It is my unfortunate experience to see many cases each month where treatment has been injudicious, where patients should not have been treated at all, where overtreatment has been

responsible for even greater danger than might have been expected from the syphilis itself.

In attempting to plan out a course of treatment for the individual suffering with syphilis many factors should immediately be taken into consideration. The first of these is, of course, the age of the syphilitic. What constitutes an adequate treatment for the young man or woman in the full bloom of life is far too severe and cannot be tolerated without definite injury by the senile syphilitic. In the same way, what might be considered as a poor form of treatment for the young man or woman in the full bloom of health, becomes, on the other hand, the method of choice for the infant or young child. The question of the age of the patient, therefore, is one continually bound up with the question of the proper therapeutic procedure.

A second factor which one should always consider is the duration of the syphilis. It must immediately become apparent to you that this factor is worthy of deep consideration when one considers the difference of prognosis involved in this factor. It is generally conceded that the fresh early syphilis intensively treated has a vastly better prognosis than the untreated syphilis one, two, or three years old. The latter again has a better prognosis than the syphilis somewhat older; and yet, after a span of years in which the syphilitic has remained untreated and well, say twenty or even thirty years, the prognosis compares favorably, at least so far as quiescence is concerned, with the fresh syphilis. The duration of the disease in the individual, moreover, takes on a different aspect when one views it with the age of the individual; thus, for example, a syphilis of fifteen years' duration in a youth of the same age, in other words, syphilis dating from birth, would vary in its prognostic significance from a disease of the same length of time existing in a middle-aged person, in a young adult, or in senescence. The point, I think, must be clear to you, therefore, that the duration of the disease in the individual is a factor of great importance in determining upon a course of treatment for the particular individual under consideration.

The third factor, and one I feel too lightly considered, is

the presence of coincident disease other than syphilis. I know of no other factor neglect of which will lead to greater damage by routine than in the unfortunate cases in which syphilis is found coincident with tuberculosis; in which syphilis and a diabetes coexist; in which syphilis and a chronic nephritis are found; indeed, in any condition of itself grave in which the individual may have contracted a syphilitic infection, at some time during the course of his life. I shall briefly illustrate this point by a case or two which I think serve adequately to illustrate the point.

The next factor under consideration is the type of syphilitic lesion present. It must be obvious to you that in dealing with a fresh syphilis, say, with the primary and secondary manifestations present, one is faced with a vastly different therapeutic problem than with a syphilis in which the constitutional infection has been established for many years, and in which the predominant symptoms for the moment are of the heart, the liver, the nervous system, the bone, or of the eye. This question is intimately associated with the variegated picture of syphilis, its definite tendency to an epochal existence, and to the very special efforts which must be directed in cases of the kind just mentioned, not only to the constitutional infection, but to the particular organ involved. This factor I shall also illustrate to you by the citation of cases.

The last factor to which I wish to direct your attention, although it is by no means the last of all the factors which might be mentioned, is the social status of the individual. In this factor we are intimately concerned with the syphilitic as a carrier, as a possible disseminator, of the disease. Viewing the subject from this side, it must be evident that the patients who are most actively disseminating, those who are potential parents, the young adults, the young children, and, indeed, the infants, require a special consideration when viewed from the therapeutic standpoint, from those who may be said to be, as carriers, far less dangerous to the community and to their immediate contacts. Thus, for example, one would hardly be justified in embarking upon a most intensive form of medication in, let

us say, a senile individual, such as I have recently seen, a man of seventy-five with an accidental infection, as one would pursue with the same type of infection in an individual thirty or forty years younger. The senile patient is no longer in the same intimate contact with others. He is no longer a potential parent, scarcely ever potent, and, quite apart from his social status, such a patient would hardly stand the rigors of an intensive treatment such as would properly be directed in a young individual.

I have thus far alluded to various factors which should be considered, and which most certainly modify a method of treatment in syphilis. Before citing cases to you I would further direct your attention to a fact which I believe will not be accepted generally, but of the truth of which I am firmly convinced. There are unquestionably, to my mind, many cases of old syphilis which should not receive treatment. I will, perhaps, make my stand clear when I call to your attention that one of the fundamental errors which have crept up with the employment of the Wassermann reaction is its interpretation as an absolute guide to therapeusis, and as constituting an invariable indication, so to speak, for treatment. This view I believe to be wholly erroneous. There are many patients, unquestionably, who have received adequate treatment, who have lived their lives and are useful members of the community, who are in no way dangerous to the community or to themselves, who have, so to speak, outlived their syphilis, and yet whose blood tests are permanently positive. These are grouped in the so-called Wassermann-fast cases—many of whom it is surely a mistake to treat. Too many such patients are treated not for syphilis, but for the Wassermann test. The truth of this statement, I think, is clear to all of us who have treated patients over many years, who have followed the blind lead of what we fondly believed to be a serologic cure, and have found our patients, at the end of many years, returning in the full bloom of health, the possessors of healthy children, of non-infected wives, themselves again Wassermann positive. I would not have you believe that this is the rule, but it is, indeed, a

frequent occurrence. Generally speaking, and I hope that this statement will be taken at its proper value, I am of the opinion that if a patient has lived in good health for thirty years, and during this time has not infected others, and, indeed, has been the parent of healthy children, such a patient should not receive treatment on the basis merely of a complement-fixation test. I shall illustrate this point to you in 2 cases which have recently come under my observation, and they represent, I believe, a large group. It has been my unfortunate experience to have seen real physical damage, and great mental anguish, in this group of cases, by misdirected treatment to such patients on the accidental finding, occasionally in insurance examination, occasionally in routine, of an infection dating thirty or forty, and occasionally even forty-five years back.

The recent studies of the bacteriology and pathology of syphilis have demonstrated beyond a peradventure that spirochetes may remain latent in the individual, may become, as Warthin has pointed out, symbiotic, so to speak, with the patient's organism, and in no way associated with actual syphilitic pathology. Furthermore, I am not prepared to admit, at this time at least, that a positive complement-fixation test necessarily always means the presence of actual spirochetes demonstrable in the body. The nature of this reaction is so complex, its true meaning is as yet too obscure to admit of such a dogmatic view. I have always held, and still believe, that the Wassermann reaction in the presence of an actual spirochetosis in the blood is a different biologic reaction from that which is present many years after intensive treatment, and in the complete absence of any symptoms or signs.

Quite apart from this group of what might be termed patients who have had syphilis, rather than active cases, there remains a group of active syphilitics in whom, I think, treatment can well be withheld by reason of the utter hopelessness of the condition, on the one hand, and the real damage which frequently results on the other. In the first group, I have in mind the large class of hopelessly demented paretics, that is to say, paresis in its later stages, in which I have never seen with any degree of

certainty any lasting benefit as a result of treatment. It must be admitted, moreover, at this point that such cases frequently show marked changes for the better in the complete absence of treatment. Where such betterment takes place in the presence of treatment, therefore, one can never be sure that the cyclic course of the disease has not been the actual factor. Whatever good results, in my experience, have come from the treatment of well-advanced paretics, I believe have been due to the effect of the treatment on the constitutional infection outside of the brain itself rather than its effect on the predominating syndrome. The cases of early paresis, and we now diagnose paresis so many years earlier, I believe have a more hopeful view, and should be vigorously prosecuted.

The second group of cases to which I allude are the very severe cases of myelitis and of tabes, in which so great a destruction of the cord has already occurred that there is complete paralysis and incontinence of both urine and feces. It has never been my fortunate experience to find the slightest benefit on the predominating symptom by treatment directed to the syphilis in these cases. Indeed, I am not all at sure that many have not been made more miserable by an intensive treatment. The same statement, I believe, applies to the more rare cases of syphilitic transverse myelitis and other severe syphilitic injuries in the cord. Exceptions, I think, however, are those cases of gumma of the brain or cord in which so frequently happy results are obtained by vigorous treatment.

I wish to call your attention to the following cases, with a brief comment on the type of treatment and the type of the case that they illustrate:

Case I.—This case illustrates a combined syphilis and tuberculosis. The patient, aged twenty-six, presented himself to me with a fresh syphilitic infection, dating some two months. He stated in his history that a diagnosis of chronic pulmonary tuberculosis had been made upon him subsequent to two severe hemoptyses which had occurred some two months before. His syphilis was quite evident, being in the early secondary stage.

His tuberculosis was very extensive, involving both lungs, with extensive cavitation in the right. He was quite emaciated, running an afternoon temperature, and presented from the point of the tuberculosis alone a serious enough picture. His case was an extremely delicate one from the therapeutic standpoint, inasmuch as he was actively syphilitic, with many lesions in his mouth, and at the same time was so ill of his tuberculosis that the treatment which ordinarily and properly would have been directed to his syphilis, I am quite sure, would have resulted seriously, perhaps fatally, for him. It became, therefore, necessary to treat him cautiously for the syphilis on a line of treatment which otherwise might have been properly considered far too mild. By the cautious administration of mercury, and at the same time by placing him in proper surroundings and in competent hands for his tuberculosis, it was finally possible to approach a form of treatment which was sufficiently intensive for the moment to protect those about him, and at the same time not to injure his general health. This patient will have to be treated for his tuberculosis and syphilis coincidentally, and his treatment will have to be prolonged over a longer time and will be of a milder type than as if he did not present the dual complex.

Case II.—This case illustrates the fact that the type of the syphilis is a determining factor in the type of treatment. The patient, a man aged thirty-three years, entered the hospital on June 13, 1919, complaining of swelling of the feet and legs and swelling of the abdomen. The syphilis was contracted fifteen years previously; treatment had been indifferent. One year previous to admission the onset of the disease appeared with a general anasarca. On examination, he was found to be markedly emaciated and anemic, slightly jaundiced, and to have an ascites and edema of the scrotum. The spleen and liver were both enormously enlarged, firm and hard, with no apparent indentations or nodes on the surface. There was no evidence of cardiac disease, but the lumbar puncture denoted associated cerebrospinal syphilis of the arterial type. In addition, he had an old nasal perforation. This patient was given in-

jections of salvarsan, six in number, with a most remarkable improvement in appetite and an improvement in his color and general well-being.

Notwithstanding the fact that he became a bed patient and had proper diet and rest, his ascites became astonishingly increased. Immediately following his last treatment it became necessary to tap him almost every five or six days, and from June 22 to November 7, 1919 over 140,000 c.c. of fluid were removed from this patient's abdomen in twenty-six paracenteses. A few weeks before the end of his stay in the hospital he was placed upon the cautious administration of mercury and the iodid of potash, with most marked improvement in his ascites, and he was eventually discharged from the ward free of fluid in the abdomen. A recent report received from him indicates that he is now entirely well and has resumed his occupation.

I think it is fair to state that this patient was improperly treated at our hands. The predominating features of his case, namely, marked liver dysfunction, were such that in all probability he never should have had the intravenous medication at all. I believe that his present condition is good in spite of, rather than because of, his treatment. If this patient were properly treated, he should have received only mercury and the iodid of potash, and salvarsan should have been completely withheld from him. I believe that until one can measure liver function, this view should be taken on all cases of the various types of syphilitic cirrhosis.

Cases III and IV.—The following 2 cases illustrate associated cardiac disease due to syphilis as a distinct contraindication to intensive treatment.

Case III.—The patient, a man aged forty-four years, entered the hospital on March 23, 1920, having been transferred from the Department of Medicine with a diagnosis of syphilitic aortitis. He denied knowledge of syphilis. His present trouble manifested itself as shortness of breath two years previous to admission. This became more marked until, on admission, he

could not lie down for more than an hour at a time, nor could he give himself the slightest exertion without developing a marked dyspnea. In addition, he had considerable palpitation and some precordial pain. The clinical findings were those of aortitis and typical regurgitation. The patient received two injections of small doses of neo-arsphenamin, only 2 decigrams, to which he immediately reacted with marked improvement. His symptoms and pains disappeared; his dyspnea, while present, was markedly less, and in a short time he was dismissed from the hospital for observation. Within a very brief time the patient returned, completely decompensated, and it was only with the greatest difficulty that his reserve was brought up to such a point that he could again leave the hospital. His second respite was even shorter, and he has returned twice since, both of which times he was in so desperate a condition that it was believed he could not recover.

Case IV.—The patient, aged forty-six years, entered the hospital for treatment for syphilis. His infection dated back some twenty-four years, at which time he had had indifferent treatment. His present trouble began four years ago with failure of eyesight and pains. On examination he was found to have a typical tabes dorsalis, with all the classical findings. This patient received but two injections of salvarsan, 3 decigrams, and $4\frac{5}{10}$ respectively. The second injection was followed by severe headache and attacks of dizziness, as well as numbness and cold sweat. He became very cyanotic, and within a few days was bedfast. At this time the first suggestion of a cardiac defect manifested itself in marked arhythmia, weakness of the pulse, general asthenia and cyanosis, and signs of cardiac dilatation. He continued in this condition for about three weeks, and died suddenly in bed during the night. At the postmortem he was found to have aortitis, aneurysm, myocarditis, and syphilis of the cord and brain.

At the present writing Case III is still alive, but wholly unable to do any work. The slightest exertion brings on an attack, and he is virtually bedridden. From a rather large

experience with this type of case I am impressed with the fact that a happier result might have been expected had due attention been paid to the cardiac defect; in fact, had the patient not been treated for his syphilis at all until his cardiac reserve had been built up, if such were possible, and then his treatment should, in my judgment, have been with mercury and iodid, rather than with salvarsan. This case is only one of many which I have seen in which decompensation first occurred following injudicious and intensive treatment.

The danger of routine is admirably illustrated in Case IV, where the predominating symptoms in one system were associated with even far graver disease without clinical manifestations in another system. Little, I think, was to be hoped for in the treatment of this patient so far as the tabes was concerned. Yet the fact that he had extensive syphilis led to his treatment along more or less routine lines, with the result that his already overtaxed circulation broke down under the strain, and he succumbed not to the involvement which brought him to the hospital, but to an unsuspected visceral complication.

Cases V, VI, and VII.—The following 3 cases are cited as examples of patients who, in my judgment, should not have received any treatment whatever. One, I am glad to say, did not have treatment.

Case V had severe intensive treatment directed to him merely because of a positive Wassermann reaction, and was apparently undamaged by it, although in no way benefited, as he was perfectly well at the outset. Case VI received, on my advice, no treatment. Case VII had received so much treatment directed to a positive Wassermann that he was in a state of profound depression and terror, from which he was rescued only with difficulty.

Case V.—The patient, a man aged fifty-one, consulted me in April of this year with a history of having had a positive Wassermann reaction, found at a time when he was examined for life insurance. His syphilis dated thirty years previously, and

he had had at that time three years of continuous treatment. He had married twenty-three years previously, his wife was living and well, and one child was living and well. The serologic reactions on both mother and child were negative. *This patient had not been subjected to an examination*, but had immediately been treated by a "specialist" with seventeen injections of salvarsan and two courses of mercury and iodid. At this time he consulted an internist, who gave him a thorough examination, found an actual pathologic condition, but advised his having no further treatment, and sent him on to me for further advice. When I saw him, he proved to be a man of very vigorous constitution, entirely well so far as his nervous system was concerned, but with an enormously enlarged heart, and presenting the clinical picture of a well-compensated aortic regurgitation.

Such a heart might well have become decompensated by the treatment he had received, and it is a commentary on his excellent cardiac reserve that he had survived without apparent injury the treatment he had had. With a completely intact nervous system, with a fully compensated cardiac defect, with a syphilis of thirty years' duration, with a healthy wife and healthy child, the presence of a positive serologic reaction did not, in my opinion, warrant or justify any treatment. Such cases, I believe, are far better untreated. That they should be watched, but particularly from the standpoint of the cardiac lesion, is, of course, obvious. That they require no treatment for the syphilis present is, to my thinking, equally obvious.

Case VI.—In 1920 this patient, a vigorous, healthy man aged fifty-four, consulted me for a patch of psoriasis on one elbow. The psoriasis healed to ordinary treatment as well as such patches do. In the course of a routine examination for some minor visual disturbance it was found that he had a + + + + Wassermann reaction. He admitted having contracted syphilis at the age of sixteen, thirty-eight years previously. His treatment at that time had consisted of about one year of inunctions. He was married, had 2 healthy children, both of whom were married, and had apparently healthy children. The positive

Wassermann reaction led us to make a complete re-examination of the patient, with entirely negative findings. He was a picture of good health, and to every possible physical examination negative. I did not feel in this case that the patient should be subjected even to mild treatment. Though still potent, he was not likely to become a father, his social status was not that of an active disseminator, and there seemed nothing except the positive Wassermann reaction to warrant the intervention of treatment. Of far more importance in the determination not to treat him was the duration of the disease. Having lived with it for thirty-eight years, on clinical experience at least, one might say with great certainty that he would never suffer any further effects. A treatment directed toward the eradication of his Wassermann reaction, I am certain, would, in the first place, never have succeeded in accomplishing this. Such treatment, moreover, might have done irreparable damage to his general health, and certainly would have contributed greatly to his unhappiness.

Case VII.—The patient, a man aged fifty, had had a syphilitic infection thirty-four years previously. He did not remember the kind of treatment that he had had at the time of his infection, nor did he remember how long this was continued. He had enjoyed excellent health up to three years previously. At this time it came to his knowledge that his blood test was positive. He then had what he stated was a "nervous breakdown." He had married six years after his infection. He had 2 children, there were no miscarriages, and the Wassermann reaction on his wife was said to be negative. During the past three years he had had over twenty injections of salvarsan and over one hundred injections of mercury, in addition to six intraspinous treatments. *At no time during his course had he ever been examined.* His last physician had stated that if he did not keep his treatments up he would become paralyzed. His mental condition was deplorable—he had been sick with worry and unable to work. A complete physical examination revealed this man to be in perfect condition from the standpoint of the nervous

system, as well as from every other. His case illustrates one of the many tragedies, I believe, of misdirected treatment based on a single sign, in the absence of real symptoms. Here, again, the patient was not treated for his syphilis, but for his Wassermann reaction. The duration of the infection made it seem extremely unlikely that anything was to be apprehended in the nature of a recurrence. That he had suffered some damage from his treatment I feel reasonably sure might be expected. His mental condition, his inability to work, were all the result of misdirected therapeusis. Notwithstanding, of course, his intensive treatment, his Wassermann reaction was, at the time of his examination, + + + +, as one might well have expected it to have been. Without having seen the patient three years previously, it is not fair to state that at that time he did not have some indication for treatment. The absence of an examination in his case, however, at the time mentioned might reasonably throw some doubt upon the presence of any symptoms at the time. It is perfectly evident that his present condition is one which called for a permanent halt in any further therapeutic intervention.

It would seem almost needless to comment at this place upon the practice which, however, seems a fast-growing tendency, of treating patients who have had syphilis, and whose Wassermann tests are positive, without even giving them the benefit of a physical examination. If such a practice were not as common as it apparently is there would be no reason for discussing it. It is undoubtedly a result of the dependence on the part of busy men upon the laboratory procedures, and a complete misapprehension of the significance of the biologic test. To treat a patient merely because of a positive Wassermann reaction, and more particularly, such patients as have been herein mentioned, has as little, perhaps, to commend itself as insisting on a perfectly healthy patient taking to his bed because of the presence of a positive Widal test subsequent to recovery from typhoid fever. The analogy, perhaps, is not good with regard to the nature of the two tests, but clearly as little intelligence is exercised in the one as in the other.

In conclusion, permit me to emphasize that the first requisite in treating syphilis is a complete survey and evaluation of the patient, not only from the side of his disease, but from the particular position he occupies in society, from the side of what can be obtained by treatment, from the careful study of the predominating features of the disease, with due regard for the peculiarities of the particular system involved. Lastly, what I believe to be of paramount importance, the acceptance of the fact that the biologic test in itself is not of necessity an indication for therapeutic intervention.

CLINIC OF DR. HUGH CABOT

UNIVERSITY HOSPITAL, ANN ARBOR

THOSE "PAINFUL" WOMEN

EVERY physician in large practice sees frequently women of all ages, occupations, and incomes whose chief complaint is "a pain" of any one of a great variety of types, situated in their "midship section," which might be due to some organic lesion of one of the groups of organs situated between the diaphragm and the floor of the pelvis, and for which relief is sought.

It was no reproach that half a century or more ago we were unable accurately to diagnose the difficulties of these people, but obviously, with the enormous increase of the elaboration and accuracy of modern diagnosis, it might reasonably be expected that we should be able to assort their difficulties, select the appropriate remedy, and apply it. In the assortment of the proper therapeutic agent we have been enormously assisted by the ever-increasing safety of surgery, so that in this department of mechanical therapeutics we may select treatment with almost the same assurance of safety as was the case in the administration of drugs. Clearly here is a field in which our ability to relieve human suffering should have improved so much that we might point to it with justifiable pride and "tell the world" of our contributions to the sum of human knowledge. But can we?

Certain it is that every physician of large experience sees an enormous number of these people upon whom one or more abdominal operations have been done, and who still have their pain. Years ago the majority of these unsuccessful operations were done upon the viscera of the female pelvis presumably because they were more accessbile to what we believed to be accurate diagnosis, but with the advent of the *x*-ray as an im-

portant addition to our diagnostic machinery, the proportion, though not the number, of unsuccessful pelvic operations has decreased, and now we are quite as likely to find scars, often extensive, sometimes mutilating, through which efforts to relieve supposed lesions of gall-bladder, stomach, appendix, or kidney have been unsuccessful.

It is possible from the records of this hospital to collect a group of cases amounting to almost one for every day in the year in whom this situation exists; people who have tried the appeal to surgery as a remedy for their pain, regarding it as substantially a certain cure, and at the hands of excellent practitioners all over the country have gotten no relief, and are in many respects worse off than they were before.

Take, for instance, the case of Mrs. K., twenty-four years old, who came to us recently with the following story: Three years ago she began to have attacks of sharp pain in the right lower quadrant of her abdomen, sometimes accompanied by nausea and vomiting, sometimes by tenderness. On account of this group of symptoms her appendix was removed and she made a perfectly satisfactory convalescence. But a few months later pain returned of a somewhat different type, but still situated in the right lower quadrant, still coming in attacks, though at this time without nausea or vomiting. As far as we can discover this pain was never referred to the upper right quadrant, but for some mysterious reason, about two years ago, she had her second operation, in which the attack was made upon the right upper quadrant apparently with the view that the gall-bladder was the source of her trouble. No lesion of the gall-bladder was found, but there were some adhesions about the old scar which it was thought might be the cause of her difficulty.

Now she comes to us still having her pain, though it is somewhat more widely distributed, as might be expected since the right side of her abdomen wall is chiefly occupied by long, somewhat sensitive scars. Inquiry into her history shows that since childhood she has been subject to fainting attacks of unknown origin and milder attacks which she describes as "vertigo." Careful examination of her chest shows diminished resonance

over the apices and *x*-ray shows evidence of an apparently healed tubercular process in the left apex. Without going further into this picture it is quite clear that she is a person of unstable nervous constitution who has apparently had tuberculosis and in whom complaints of abdominal pain ought to have been viewed with the gravest suspicion that they lacked organic bases. There can be little doubt that far from having been benefited by the mechanical therapeutics which have been applied to her abdominal viscera, she is decidedly worse.

Or, take the case of Mrs. W., thirty years of age, who came to us recently with a history going back some five years, beginning shortly after the birth of a child, and consisting of pains of various types referred to the abdomen, sometimes in the upper, sometimes in the lower quadrants, for which an unsuccessful appendectomy had been done through an incision long enough to permit the exploration of the whole abdomen. Following this operation her pain has been definitely worse. She has slowly lost weight from 185 to 130 pounds. Though she has had in the past several attacks of so-called pneumonia, careful examination of the chest, including *x*-ray, is entirely negative. Careful study of the gastro-intestinal tract with the "opaque meal" shows no evidence of an organic lesion. Examination of her back shows marked tenderness over the spine of the tenth dorsal vertebra, but without evidence of bony abnormality. In addition to her abdominal pain she frequently has a pain referred to the posterior aspect of the left leg, which she calls "sciatica." This pain has been relieved by wearing a snug corset, but this she finds herself unable to tolerate on account of the increase of abdominal pain. The neurologic consultant finds the so-called typical stigmata of hysteria. She comes to us for further surgery. It seems more or less clear that she has already had too much.

Or, take the case of Mrs. R., forty-nine years old, who comes to us with a diagnosis of gastric ulcer. Here is a woman past the menopause who has had a painful story for many years; who began her investigations of the benefit derivable from abdominal surgery with an operation upon her pelvic viscera, the nature of which is unknown, twenty-five years ago. Nine years ago an-

other operation, this time for the shortening of her uterine ligaments; seven years ago her appendix was removed; four years ago her gall-bladder was abolished—these later operations in the midst of a prolonged, rather stormy menopause. And still she has pain Careful study of her abdominal viscera by gastro-intestinal *x*-ray and barium enema, examination of her pelvis, and of her genito-urinary apparatus, all are negative; and yet, forsooth, the referring physician is annoyed that we will not advise more surgery. In this particular case it might at least be suggested that the failure of surgery may be due to the fact that much of it was undertaken at a time when the nervous instability accompanying the menopause might well have suggested the advisability of caution.

Again, pause for a moment to consider the case of Mrs. E., fifty-eight years old, who, eight years ago, on account of pain in the right side, but not well localized to any region, had her right kidney suspended and her appendix removed through two quite ample incisions. Little benefit resulted, and she seeks relief on account of vague pain in the lower abdomen. Physical examination is entirely negative. Gastro-intestinal *x*-ray also negative. There is marked sensitivenses over the scar through which it is alleged that her appendix was removed, though, as it is long and in the midline, it gave ample access to other viscera. After puzzling for some time over her difficulties it developed that what was really troubling her was the fear of cancer due to the fact that she then had a sister dying of the disease. She came advised to have an abdominal exploration. What she needed, of course, was assurance.

Even more striking is the case of Mrs. K., aged forty-five years. Thirteen years ago on account of abdominal pain of a rather nondescript type her appendix was removed, with relief for a brief period. Ten years ago she had influenza from which recovery was slow. Three years ago, another attack. For many years she has had terrible headaches lasting three or four days, coming at fairly regular intervals. For many years she has had what she describes as a "bad acting heart" with attacks of shortness of breath and palpitation. About a year ago, on account of

dull pain referred to the right upper quadrant of the abdomen, the gall-bladder was explored and found normal, the only abnormality discovered being some adhesions along the large scar through which the appendix was originally removed. Physical examination was extraordinarily negative. Her "bad acting heart" under the most careful study appears to be normal, and now she comes to us because she has been advised to have another operation, this time, forsooth, because a prolapsed and somewhat tender ovary is thought the possible cause of her difficulty. The neurologic consultant takes the view that she has a "constant psychopathic personality," an opinion which seems at least as likely to be correct as the previous ones which concerned themselves with organic lesions within the abdomen. Truly, a series of tragic therapeutic blunders.

But, unfortunately, the people who thus suffer from misdirected mechanical enthusiasm are not all women.

Take the case of Mr. R., aged fifty-two. Since the age of fourteen he has had more or less trouble which he refers to his stomach. This consisted of pain which usually came on two or three hours after meals. There was no vomiting. It was not relieved by food or by alkali. This pain would come in more or less definite attacks, last several hours, and then disappear, sometimes not returning for months. Five years ago he had his appendix removed and believed that marked benefit resulted, but about two years later his symptoms returned. Since that time he has been losing weight. For the last year he has had pain in the left side above the rib margin, especially troublesome during the last six months. During this time he has had less pain referred to the stomach. During the past year he has begun to take morphin, and though it is not known how much he takes, it is suspected that he has developed a definite addiction. For many years, but increasingly during the last year, he has had constipation. Searching examination of his gastro-intestinal tract is negative. A very thorough examination shows nothing but a moderate degree of arteriosclerosis. His urinary system is normal; his Wassermann is negative. It therefore appears that he has moderate, rather early, arteriosclerosis. It is con-

ceivable that his pain is of that origin. He clearly has chronic constipation and he clearly has a morphin addiction. Certainly in this man one abdominal operation without success should be enough, and it is perfectly clear that exploratory surgery is not only unnecessary, but decidedly contraindicated.

And finally, take the case of Hattie K., aged fifteen, who, two years before, had her appendix removed on account of burning in the epigastrium, relieved by nausea and vomiting. No relief followed the operation, and she applied for further study. Physical examination, though made with the utmost care, was entirely negative, but the history gave every evidence of marked mental abnormality. She complained of poor memory, a great variety of pains, aches, paresthesiæ, and so forth. She was markedly backward at school and had many attacks of the "blues." The psychiatrist at once made a diagnosis of anxiety hysteria and feeble-mindedness. Here then was an attempt to remedy by surgery a situation belonging purely in the field of neurology and psychiatry.

This citation of cases might be continued almost indefinitely.

Now, it is upon the family practitioner and internist that this problem bears most heavily because they most often stand to the patient in the relation of a "next friend." Upon them devolves the responsibility of giving advice which will be regarded as authoritative. Their dilemma is a puzzling one. They consult the surgeon. Operation is advised, and they are faced with a situation in which they must either disregard the opinion of the consultant whose advice they have asked, or tell the patient to go ahead with an operation the benefit from which may appear to them at least problematic.

In all these cases the pain complained of might have been due to an organic lesion, and not rarely these people have heard enough in these days of the public discussions of private diseases to have a most accurate picture of the symptoms of many of the disorders to which their flesh might be heir. There has been and still is a considerable tendency to take the rather light-hearted view of "go ahead; try it and see." "Surgery is a trivial business,

at least no harm will be done." But is this true? Certainly not. If one fact in this puzzling situation is more clear than another, it is that unsuccessful operations of this kind do not leave the patient as she was before. Not only is she not the same, but she is worse. Not only is she not relieved of her pain, but the fact of pain is more firmly driven home upon her consciousness.

Furthermore, we have, I think, overlooked the very definite effect of the trauma of modern surgery upon personality. I gravely doubt whether any important surgical operation ever leaves the patient with as sound a personality as he had before. If this be true or even partly true, it follows that in these folk with abnormally sensitive personalities and often abnormal personalities far greater damage will be done by surgical insult.

We cannot with any show of reason take the view that an unsuccessful operation is harmless. The degree of harm varies directly with the abnormality of personality. In searching about for an explanation of the pain from which these people undoubtedly suffer we have overlooked too often the fact that in just such cases pain may be not a result of abnormal function, but a refuge for an abnormal personality. Many of these people suffer not from maladjustment of their gross physiology or from definite pathologic physiology, but from faulty adjustment of their body to its environment. In an unfortunate moment they have discovered that as long as they appear and pretend that they are healthy nobody loves them, but just the moment that they appear sick, the world, or at least, their family, is at their feet. What more probable, then, that quite unconsciously they will seek refuge behind those symptoms which make life more tolerable? Surely this is not an uncommon situation. All of of us have seen people, commonly women, but not rarely at least physically male, who will undergo any number of operations, face any risk, have hair-breadth escapes from death, simply that they may avoid facing the world in all its roughness.

These are days of publicity and the medical profession is perhaps more on trial than at any previous time. Unsuccessful

surgery makes a deep impression upon the community and one not to the advantage of the conscientious practitioner.

Whether or not it be true that unsuccessful surgery is increasing, there is far too much of it, and evidence is lacking to show that we are sufficiently on our guard so that such accidents will occur only in such a proportion of cases as may be credited to the fallability of human nature. Since it is undoubtedly true that the accuracy of our methods of diagnosis of the abnormalities which go on beneath the surface has greatly increased and is still increasing, it follows that we are required to be far more certain than in the past that real organic lesions exist. It is, as a rule, possible today to show that organic lesions within the abdomen have produced changes which can be demonstrated before operation beyond reasonable doubt, and we should insist far more than has been the rule upon positive evidence rather than mere suggestion. A quarter of a century ago exploratory operations upon the contents of the abdomen were justifiable in a large number of cases. Today that number has enormously diminished, and except the condition is urgent and may be thought to threaten life, exploration for the source of abdominal pain should rarely be undertaken. If we cannot demonstrate the presence of a mechanical condition which can in all human probability be remedied by a mechanical measure which we call "surgery," then we shall do well to search further for the causes of pain. Far more than in the past or even perhaps in the present must we consider personality, trust less to physical examination, and more to studies of individual psychology. Too much, as I think, are we still guided by the view, which was perhaps sound years ago, that the benefit of the doubt in an obscure case might lie upon the side of an exploratory examination. We are still to some extent influenced by the feeling that the study of pathologic physiology, which is but another name for an exploratory laparotomy, is a harmless amusement, and not rarely an operation is advised in sheer desperation because, forsooth, the physician is at the end of his therapeutic resources. These specters of the surgical past are now returning to mock us in our boasted safety. Our patients still are more trustful of us than

we are of our professional brethren. How often do we see exploratory operations done on physicians? The confidence which the profession has in the past so richly deserved will be lost if we deserve it as little as the frequency of ill-advised and unsuccessful surgical operations would appear to warrant.

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ROENTGEN-RAY TREATMENT OF SKIN DISEASES

IT is the consensus of opinion among dermatologists that rays of a long wave length are especially indicated in the treatment of superficial dermatoses. There is very little difference in the biologic action of the "soft" *x*-rays and the "hard" gamma radiations of radium. The therapeutic effect is apparently due to the absorption of rays by the tissues through which they pass. The various wave lengths differ in their ability to penetrate tissue of the body. For superficial skin lesions the question of penetration is not as important as the question of dosage, but for deep therapy improper penetration, and consequently imperfect depth dosage, result in disappointing failures. In this paper I wish to present the technic and results of Roentgen-ray treatment of various skin diseases, as carried out and observed at the University of Michigan Hospital during the last three years. It is not my intention to present new methods of treatment, even though the application may vary a little from that used by the reader, but merely to emphasize the well-known fact that Roentgen rays are a useful agent in the armamentarium of dermatologic therapeutics.

The method employed was, in the main, that taught by the late Dr. James Van Zwaluwenberg. It differs a little from the MacKee practice, as outlined in his recent text-book, "*x*-Ray and Radium Treatment in Diseases of the Skin," in that we use a longer spark gap, higher milliamperage, and usually employ a filter. I have used the technic given by Hazen, Witherbee, Reamer, and others on some dermatoses, with gratifying results.

It is my experience that mycelial dermatitis, senile keratoses, and other squamous eruptions yield more promptly to the unfiltered than to the filtered rays. The aluminum screen enables us to give longer exposures, and diminishes the chance of producing a burn by filtering out the soft rays which act so readily on the skin. In the hands of a novice filtered rays are much safer than the unfiltered.

A varying number of different dermatoses have been treated with Roentgen rays in the hospital during the last three years. A few of the named conditions appearing in the list which follows represent only a single case. The list is as follows:

Acne rosacea
Acne vulgaris
Actinomycosis
Angioma
Blastomycosis
Bromidrosis
Callosity
Cheilitis glandularis
Clavus
Condyloma acuminata
Dermatitis coccidioides
Dermatitis exfoliativa
Dermatitis papillaris capillitii
Dermatitis venenata
Dysidrosis
Eczema
Epithelioma
Erythema induratum
Favus of scalp and body
Folliculitis
Furunculosis
Granuloma annulare
Granuloma fungoides
Hyperidrosis
Keloid
Keratosis senilis

Leukemia cutis
Leukoplakia
Lichenification
Lichen planus
Lupus erythematosus
Lupus vulgaris
Lymphangioma circumscriptum
Melanotic sarcoma
Mycelial dermatitis
Nevus
Onychomycosis
Paget's disease—classified under epithelioma
Paronychia—classified under infections
Prefungoid stage of granuloma fungoides
Pruritus—general
Pruritus ani
Pruritus vulvæ
Psoriasis
Rhinophyma
Scrofuloderma
Seborrheic dermatitis of face and body
Sporotrichosis
Sycosis vulgaris
Tinea barbæ
Tinea tonsurans
Tuberculosis verrucosa cutis
Verruca plana
Verruca plantaris
Verruca seborrheica
Verruca vulgaris

This list does not include every dermatologic condition which can be successfully treated with *x*-rays, but for the most part represents the conditions most commonly met in either a dispensary or a private practice. Superficial malignancies, acne vulgaris, mycelial dermatitis, eczema, and the papulosquamous conditions are the most common skin diseases we have to treat.

Superficial Malignancies.—In this group 218 epitheliomas,

including 3 cases of Paget's disease and one melanotic sarcoma, were treated. The sarcoma was not benefited by irradiation. Death resulted three months after treatment was first instituted, and autopsy revealed general metastases. The epitheliomas occurred, for the most part, on the exposed surfaces of the body, *i. e.*, cheeks, forehead, nose, arms, and hands. We have found that better results are obtained when irradiation is preceded by curetment and cautery; 70 per cent. of our cases were treated following the so-called "Sherwell operation," which is performed by removing the friable epitheliomatous tissue with a dermal curet under a local anesthetic. Care must be exercised to remove all of the diseased tissue, following which the clean base is treated with a 60 per cent. acid nitrate of mercury solution. The caustic is neutralized from four to eight minutes later—depending on the size of the lesion, the proximity to large blood-vessels, nerves, etc., with a sterile bicarbonate of soda paste. One to five *x*-ray treatments are given then at bimonthly periods, with the idea of destroying the outlying radicals of the tumor which sometimes extend beyond the apparent border. Out of this number of superficial epitheliomas I know of only 2 cases which were unsuccessfully treated by the combined method. One case failed, I believe, because it involved the cartilage of the nose, and later it was successfully removed surgically. The other was that of a latent luetic presenting an epithelioma on the tip of the nose, when a suberythema dose stimulated the growth. There are, perhaps, some others in which relapses occurred, inasmuch as it was impossible to follow up some of the cases after they had left the hospital. We attempt to keep every case of malignancy under observation for at least two years after being discharged as clinically cured. The *x*-ray technic used on most of these cases is as follows: Focal distance, 12 inches; spark gap, 9 inches; milliamperage, 5; 1 millimeter aluminum for filter; time four minutes. Exposures are made every two weeks for three or four times.

Some epitheliomas, as well as other dermatoses, have been treated according to the technic outlined by Kingery. This method is particularly applicable to the cases in which the com-

bined method of treatment is impracticable. A massive dose is given at the first exposure, one-half the massive dose is given at three-and-a-half-day intervals, or three-fourths of the original dose is given at weekly intervals. For example, one successfully treated case received an erythema dose through 3 millimeters of aluminum. With our machine this set-up is used: Focal distance, 12 inches; spark-gap, 9 inches; milliamperage, 5; time, seven and a half minutes. Three and a half days, seven days, ten and a half days, and fourteen days later three-and-three-quarter-minute treatments were given with the above factors remaining constant. A word of warning might not be out of place—treatment should not be given more than five or six times in such quantities unless the gravity of the condition distinctly indicates it, for there is a great danger of producing telangiectasia, atrophy, or even an *x*-ray burn. Care must be exercised to cover the normal tissue with lead protectors—exposing only the areas into which the malignancy might extend. The associated lymph-glands should, by all means, be exposed to the rays, as metastases might possibly be present. This intensive form of treatment keeps the diseased tissue saturated to the point of toleration, and the maximum effect of *x*-ray is obtained.

During the past few months in lesions that have been too extensive for either the combined treatments, or Kingery's intensive treatment, I have been using long exposures through copper filters, with gratifying results. One hen's egg-sized basal-cell epithelioma of the neck healed following three exposures, and is clinically well today. At the present time, even though many dermatologists believe that superficial cutaneous cancers respond better to unfiltered than to filtered rays, I am inclined to believe that harder rays will be used more commonly on superficial malignancies in the place of electrocoagulation, desiccation, cautery, caustics, soft *x*-rays, or various combinations of these treatments. *x*-Ray seems to be the treatment of choice, for better cosmetic results are obtained, as a rule, than from surgery, cautery, etc. There is less danger of producing telangiectasia with hard rays than with soft rays.

Senile Keratosis.—We have treated 30 cases of senile kera-

tosis with the unfiltered ray, giving about one and a quarter skin unit dose, and repeating in two or three weeks, if necessary. As far as we know, treatment has been satisfactory. The technic is as follows: Focal distance, 12 inches; spark gap, 9 inches; milliamperage 5; no filter; time, two and a half minutes. This type is particularly important, inasmuch as most epitheliomas start from such lesions, and their successful treatment with *x*-rays undoubtedly saves many cases from undergoing carcinomatous degeneration at a later time.

Acne Vulgaris.—Two hundred and twenty-four cases of acne vulgaris have been treated. In about 5 per cent of the cases local treatment was also instituted, which consists of removal of comedones and incision and drainage of pustules; and many of the patients were instructed to abstain from an excessive carbohydrate intake, and to regulate faulty elimination. Patients receive weekly treatments for a month—followed then by monthly treatments for four times, which are supplemented with lotio alba—a mild astringent. The following technic is used: Focal distance, 9 inches; spark gap, $7\frac{1}{2}$ inches; milliamperage, 4; no filter time, 35 seconds for the first treatment and 25 seconds for subsequent weekly treatments, and 35 seconds again for the monthly treatments.

All of our cases have been benefited by treatment—some more than others, even though receiving only two or three treatments. The extensive pustular acne responds the slowest to irradiation—the local treatment in this type of acne is of the greatest importance. I believe *x*-ray is the treatment par excellence for acne, but one must never overlook the fact that there is the possibility of producing a permanent atrophy of the skin if treatments are too heavy or continued over too long a period of time. One case of atrophy resulted from improper dosage given in this department.

Dermatitis Papillaris Capillitii.—This is a keloid condition occurring on the posterior part of the neck, following a former pustular folliculitis. The hypertrophic scar responds slowly to the technic as outlined under keloid. The deep-seated pustules can be cleared up more rapidly by the electrocoagulation method.

A steel needle should be inserted deep into the pustule after anesthetizing the skin. Any infected area can be entirely destroyed by one treatment. Of the 7 cases treated with *x*-ray alone only temporary benefit was obtained.

Psoriasis.—Forty-three cases of psoriasis were treated. To our knowledge, every case was greatly benefited. Many remained entirely well for months before relapsing again. One case with isolated lesions was treated over a long period of time with a dose which we now know was a little too heavy. It resulted in a cure, but also in the production of a telangiectasia. Since then our dose has been diminished a little. Our maximum dose now is about one-half erythema dose, given every two weeks. The technic is as follows: Focal distance, 12 inches; spark gap, 9 inches; milliamperage, 5; no filter; time, one minute. Only six or eight treatments should be given.

Mycelial Dermatitis.—Sixty-eight cases of mycelial dermatitis were treated. This is a condition which until very recently was confused with eczema, or perhaps dysidrosis. It owes its origin to vegetable parasites, and is, in reality, a ringworm infection. Usually the lesions appear on the hands and feet, and frequently it is impossible to make a diagnosis of mycelial dermatitis without a positive culture, inasmuch as it so closely simulates eczema clinically. *x*-Ray is a treatment of choice for this condition. The rapidity of recovery is most striking. Treatments are given every two weeks in the long-standing cases, and weekly in the acute cases, even though a secondary pus infection is present. Relapses in this condition are very common, and whenever this occurs it is the opinion of the patient that *x*-ray treatments were not successful. Reinfections come either from extremely resistant spores left in gloves, house slippers, etc., used perhaps months before by the patient, or by reinoculation of the parasites directly into the skin from infected material. The following technic is found to be the most effective: Focal distance, 12 inches; spark gap, 9 inches; milliamperage, 5; no filter; time, one minute when weekly treatments are given. The time is lengthened to one and one-half minutes for bimonthly exposures. Usually four or five treatments result in a cure.

Eczema is a term used to include a large number of skin diseases, including occupational dermatitis, infectious dermatitis, mycelial dermatitis, and conditions where the etiology is still undetermined. Ninety-eight cases were treated. The technic was like that described for mycelial dermatitis. Relief is prompt following *x*-rays. However, in infantile eczema and in senile eczema, where pruritus is a very striking symptom, *x*-ray is not as effective. A clinical cure in other types can usually be obtained after three or four treatments, except in the cases occurring at the extremes of life. All of our cases excepting infantile eczema have been greatly benefited by one or two treatments; many have been permanently cured. A very few relapsed, particularly those in which the etiology is obscure. It has been our experience that weeping eczema responds better to *x*-rays when either a mild astringent, such as subacetate of aluminum, or boric acid saturated dressings, are used for a few days before *x*-ray is instituted.

Favus; Sycosis Vulgaris; Tinea Barbæ; Tinea Tonsurans.—From the above-named condition 62 cases were treated, using the technic described by MacKee and Remer for epilation. I have failed to epilate scalps completely when hair was not clipped before irradiation. Consequently, it is advisable to clip the hair before treatment. Great care must be exercised to prevent overlapping of the rays, as there is a great danger of producing a permanent alopecia when an overexposure is given. Epilation is usually accomplished in one treatment. The hair falls out in ten days to two weeks. To obtain a permanent cure antiparasiticides should be prescribed about four days following irradiation, and used for a week following complete epilation. Cure is effected in this condition by the mechanical removal of the parasites, which is accomplished by epilation, and not by the direct action of Roentgen rays on the organisms themselves. It is also advisable to instruct patients about the possibility of reinfection from contaminated head apparel. This can be obviated by using paper caps, which can be burned after use.

Onychomycosis responds very slowly to *x*-ray treatment. Treatment to be successful must be supplemented by a strong antiseptic, such as phenol.

Verruca Vulgaris; Verruca Plantaris.—From the two above-named diseases 75 cases were treated. The condition usually disappears following four or five treatments with the following technic: Focal distance, 12 inches; spark gap, 9 inches; milliamperage, 5 inches; 1 mm. aluminum filter; time, four minutes for the first treatment, and three minutes for the subsequent treatments, which are given at weekly intervals. Frequently plantar warts require seven or eight treatments before disappearing, and no apparent improvement may be noted following the first four or five. We have not failed to effect a cure when a sufficient number of treatments have been given.

Granuloma Fungoides and Prefungoid Stages of Granuloma Fungoides; Leukemia Cutis.—We have treated an unusually large number of these rare conditions. Treatment was instituted with the idea of using the most useful remedy known, and not with the idea of effecting a cure. The fungating lesions of granuloma fungoides disappear rapidly following irradiation, and the patient's life has been materially prolonged. At the present time a case of granuloma fungoides is under treatment, and has been freed entirely from the skin manifestations of the disease. She entered the hospital three months ago as a bed case. For the past six weeks she had been treated as an out-patient, coming to the hosiptal from an adjacent city every two or three weeks. The technic used in this case is like that described under eczema.

Hemangioma; Lymphangioma; Leukoplakia; Lupus Erythematosus; Lupus Vulgaris.—The above conditions have not yielded satisfactorily to our treatment. Inasmuch as hemangioma, lymphangioma, and leukoplakia respond better to the gamma rays of radium, patients have been advised to receive the more valuable form of treatment. We are especially discouraged with results obtained in lupus erythematosus and and lupus vulgaris, and at the present time we rarely resort to *x*-ray in these diseases.

Folliculitis; Furunculosis; Paronychia; Acne Rosacea.—Infections from pus organisms can be greatly benefited by *x*-ray treatments. In fact, if treatment is instituted before the occurrence of pus, it is possible to make the lesions recede. Abortive

treatment in chronic furunculosis is gratefully received by the patients. Three-quarters of an erythema dose is given, and repeated in a week. The following technic is used: Focal distance, 12 inches; spark gap, 9 inches; milliamperage, 5; 1 mm. aluminum filter; time, three minutes. Similar treatment is used on paronychia and extensive folliculitis. Mild cases of folliculitis are treated with the acne technic. One case of acne rosacea presented a lesion of the cornea, which was treated six times with the acne technic. Marked improvement of vision resulted.

Bromidrosis; Hyperidrosis; Dysidrosis.—This group of diseases have, as a rule, responded to *x*-ray treatments. One case of hyperidrosis of the hands has been very refractory to treatment. At the present time this case is improving under *x*-ray technic, supplemented with 5 per cent. aluminum chlorid as an astringent. Bromidrosis and dysidrosis improve under one or two treatments. These conditions are treated with a filter, as a rule. The treatment is like that outlined under Verruca Plantaris. When the astringent is used the interval between exposures must be lengthened, for it is very likely to increase the activity of the *x*-ray. It should not be used for five days before, or five following, an exposure.

Conclusions.—Roentgen rays, properly applied, are the most useful single therapeutic agent a dermatologist has in the treatment of skin conditions. One must never lose sight of the fact that this method is a double-edged tool, and extreme care must be exercised in its administration. With our modern equipment and technic, however, the dangers have been greatly minimized, and in competent hands *x*-ray is relatively a safe agent. Under no circumstances should treatment be prolonged over six months.

I wish to express my sincere appreciation to my former chief, Dr. Udo J. Wile, Professor of Dermatology, to whom I shall always be indebted for invaluable suggestions and departmental records placed at my disposal; also to my present Chief, Dr. P. M. Hickey, Professor of Roentgenology, for his constructive criticisms and corrections.

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THE PSYCHOPATHIC PERSONALITY

PHYSICIANS deal with the individual in relation with disease. In this relationship they are concerned not alone with the specific problems of a disease as a pathologic process engrafted in the body, but also how the individual as a personality reacts to the disease, and in what extent the disease has been influenced by factors that are specific qualities of the character of the patient.

Psychiatry thus has an interest for the physician apart from its more common concern with the more gross forms of mental abnormalities classed as insanities. Human behavior can only be effectively studied from the viewpoint that it is fundamentally a problem of mind and character in relation with environment. Disordered behavior, then, must be chiefly a matter of disordered mind.

Physicians engaged in family practice will frequently be called upon to advise parents or others what to do with problems of unusual behavior arising in those under their care, or they will be consulted by those whose work primarily concerns human behavior, such as judges, lawyers, or school officials, to help them understand some particular individual whose conduct is giving trouble.

In many instances these difficulties arise out of an intelligence defect of the individual, his mental endowment being inadequate to allow him to understand the complexity of his relationships and to acquire a fund of knowledge that will enable him to meet his life problems in the way of the average normal individual.

But in many others the difficulties are to be found in malformations of character caused by an unusual influence of emotional

factors that have in some way failed to find adequate balances in inhibitions or to have those relations that we consider as essential for normal life. The effects of these are to produce a class of individuals who are not insane, in a legal sense, but yet are not normal. Individuals of this class find it difficult to adjust themselves to family life and social relationships. This leads to conflicts with the laws or they become social failures that must be given special consideration. They have been variously designated as psychopathic personalities or as those who are of constitutional psychopathic inferiority. While the group of psychopathic personalities has characterisitic features that are common to all, one usually observes that there are certain symptoms that stand out with such prominence as to give them special clinical significance. In some the abnormal qualities show as emotional instability with a tendency to outbursts of excitement and disordered behavior that occurs under even trivial annoyances. In others the individual is weak in will, unable to adhere to any sustained plan, and is easily led into acts that bring him into social difficulties. In still another type the abnormalities lie in an instability of character and a marked prominence of the imagination which leads to a pathologic type of lying and acts of deceit.

The first of these types Kraepelin has described as the excitable type of psychopath. As an illustration of this I present a young man who at the age of twenty-three while in military service committed several acts of misconduct that led to his being sent into the hospital for observation as to his mental state. He comes of a good family in moderate circumstances and that has shown no other evidence of mental or nervous disorders among its members. He was one of four children, the other three having always been average in disposition and ability and never gave the parents any trouble. He never had any serious physical illness and was always strong and enjoyed hard work. From his earliest childhood there was always friction between himself and family. He describes himself as being irritable and having an ungovernable temper. This led to his becoming seclusive and of withdrawing from family associations;

as he expresses it, "I kept by myself and took no interest in them." One matter that always irritated him was a resentment of the attitude of the family toward an older brother who was always held up to him as an example to follow. He attended school from his sixth to twelfth year and was an average scholar. There were numerous instances of truancy; these usually followed some irritation in school or family. At twelve, following an unusual episode of friction with the family, he left home and for two or three months the family knew nothing about him. During this time he worked hard and saved a little money. On his return home his relations with the family were no different, and after five months he again ran away. This time he went from place to place as his inclinations led him. He worked at various tasks and lived a solitary life, but kept himself decently. After a few months he returned to his home town, but kept away from his family. He worked at the hardest physical labor he could find, as this seemed to relieve his tension. He would work well for a period and then leave whenever he felt himself annoyed. His family again tried to have him come home and attend an agricultural college. This irritated him extremely and afterward he never again made any effort to see his family. He worked as a stoker in a furnace, never cared for associates, and was not dissipated. He never cared for women until recently, and now is much interested in a normal way in a good girl he met while in the army. At times he attended church and has always had some interest in religion. He has never drank until the last few years, and this has only amounted to an occasional glass of beer. He has never been intoxicated or arrested in civil life.

His irritability never left him. "If people did not like me, I got out of their way, as I was afraid my temper might get the best of me and I might do something serious." In arguments he would get excited and angry. He would "see red" and often got into fights. In particular he was annoyed by anyone speaking to him from behind his back or if someone startled him. Brief outbursts of passion were frequent, and in these he would act blindly, usually throwing whatever he could get hold of at his annoyers. He enlisted in the army in 1914 and was assigned

to artillery service. For some time his military reports were good. He lived a life apart from others, but his irritability continued and it required great self-control to prevent serious offenses. He then seemed to get into occasional disciplinary difficulties and between May, 1916 and June, 1918 he was court-martialed six times, the charges against him being disobedience of orders, neglect of military duties, and disrespect to his superior officers. His offenses seem to have been directly connected with periods of irritability, several offenses usually being committed at about the same time. In January, 1918 he was promoted to be corporal, but in May he was demoted to private. On one occasion when irritated by some one speaking to him from behind he threw a cleaver at an officer's head. He always had a chip on his shoulder, and in his frequent outbursts of passion he would act without thought or reason. His last offense was for being absent without leave when he took an official automobile and went on a joy ride. While in the guard-house he was sulky and seemed so obviously in an abnormal mental state that he was sent to a hospital for observation.

As one looks at the young man he appears physically well built and aside from a surly attitude he seems quite normal. There are no evidences of physical disease and his neurologic examination is negative. He reacts to the examination with irritability, wants to be left alone or given his punishment. He has no feelings of remorse for his actions, but accepts them as matters beyond his control. He thinks that he is being persecuted, that others have done the same things and gotten away with it. He has at all times been clear in his comprehension and there is an absence of all evidence of a formal type of psychosis.

One, however, cannot feel as he discusses his life's history and when one watches his reactions about the hospital that he is quite normal in his mental constitution. All through his life he has shown an unstable emotional background and unusual intensity in the force of his emotional stresses that has made control impossible. The episodes of excitment have been of brief duration and yet in the intervals between outbursts he has shown pathologic traits, such as dislike for associates, jealousies,

suspicions, and a character absolutely unadaptable to social requirements. It is these outbursts of anger and excitement following annoyances and ill humors that distinguish the group of the excitable types of psychopathic personalities from the others of this general class. One cannot state with definiteness what the future course of his life will be, but the aggressive character of his actions portends that one may expect him to repeatedly get into altercations, some of which may have serious results. The effects of this may be to bring about his confinement in institutions or prisons. A considerable number of this class commit suicide in their periods of irritability and dissatisfaction.

This young man contrasts strongly with another patient who shows very clearly traits of character that are distinctly psychopathic in quality, but the nature of these lies in a weakness of character and a tendency to be easily led into bad situations rather than to be aggressive and unload emotional tensions in outbursts of violence.

This patient has for many years given his family a great deal of trouble. In spite of more than average opportunities for education and the development of a high type of character, he has shown himself to be weak in will, lacking in self-control, and unconcerned about the moral delinquencies that have so frequently brought grief to the family. The character of his conduct and his seeming inability to profit by training or punishment suggested to his family that his difficulties might be related to some abnormality of mind that would at least explain why he could not live as a normal man. For this reason he was sent to the Psychiatric Clinic. He is now twenty-nine years of age. He comes of a family of unusually good social position and free from gross evidence of mental or nervous disorders. However, his father during the early years of the boy's life was heavily alcoholic, and the indirect effects of this upon the home life may have been a factor in shaping bad qualities of character in the growing child.

At the age of ten he had chorea, which kept him out of school for two years. Until he went away from home to attend preparatory schools he was regarded as a good scholar. But then he did not apply himself. It was observed by his teachers that

he did not seem to show any seriousness of mind or firmness of purpose. He entered college at about twenty, very badly prepared. There he did not study, spent his time in dissipation, drinking heavily, and gambling. To obtain money he passed worthless checks which brought about his expulsion from school. He then entered the Navy. There his dissipations continued. He was easily led by bad companions and never showed any capacity to stand on his own feet and live a correct life. He was discharged from the Navy and found employment in various business relations. He was always unreliable and showed no deep interest in anything he took up. He never seemed to have money enough to gratify his desires. He gambled much, but was usually a loser. He signed notes and forged checks to pay his debts. His family always came to his rescue and kept him from legal punishments. After he had gotten out of a scrape he would profess repentance, but would soon drift back into his old ways. After numerous instances of this type his family secured his admission here for observation.

The examinations show no important physical or neurologic abnormalities. His appearance and general attitude is that of a good natured and well-bred young man. He shows no evidence of a definite psychosis. His abnormalities lie in a certain softness in disposition and an inability to control his conduct in ways that he knows are right. He knows he has been bad and that his behavior has brought grief to his family, and he is now sure that he will give up all his bad habits and live a correct life. He was inclined to shield himself from all measure of blame, laying many of his difficulties on the bad influence of his associates. The treatment followed has been directed toward strengthening his good intentions and putting him in the best of physical health. The question is whether he will be much helped by this.

As one reviews the facts in this case the most outstanding feature is the weakness of will and lack of sustained plan that has been present so many years. In spite of a clear knowledge of right and wrong and a degree of intelligence somewhat above the average, he is unable to resist even mild influences toward acts of conduct that get him into serious difficulties. There is also

lacking a normal emotional consideration for his relation to others. The degree of these traits and the repeated occurrences of his delinquencies shows an inherent weakness of character. He is constitutionally abnormal. It is not so much a matter of possessing any specific abnormal qualities, as it is the preponderance of qualities that in themselves are not essentially pathologic, but in their relations to other mental qualities prevent him from living as a normal man and mark him as one of psychopathic constitution. While he must be regarded by society as a criminal, he must be looked at as one in whom one can understand why he acts this way. The treatment that can be carried on at this period of his career offers little hope of success. While in the hospital we have tried to have him rationalize his conduct and to see the foolishness of continuing as has he been in the past. At times one feels as if one has accomplished something and that after he leaves here he will adjust himself to a decent life. But we know from our experiences with numerous others of the same type as this young man that we have accomplished little. The hope for problems such as this lies in the early recognition of the abnormal traits of character and of shaping his environment and training so that these will become less marked as he grows older. If his life after he leaves shows no change, then for the protection of society and as an economic measure in the conduct of our police and court procedures he should be restrained for a long period in prison. (This patient was discharged after a few weeks. Within a month after this he was arrested for forging checks to pay gambling debts. The court with a knowledge of the results of his psychiatric examination sentenced him to prison for a long term of years.)

In its main characteristics this case corresponds with what Kraepelin has classed as the helpless or inadequate type of psychopathic personality. The special features of this type are the weak and aimless will and an inability to carry through any continuing task. Individuals of this type are sometimes unusually talented, but they have no real intellectual interest in what they take up. Usually they are good-natured, but are apt to be self-conscious and have an exaggerated idea of their capabilities. They react

badly to alcohol and many of their offenses are committed when under its influence. They easily drift into the criminal class and many of the women become prostitutes. Their discouragements commonly lead to attempts at suicide.

A very different type of psychopathic personality is that of this ex-soldier who is sent into the hospital by the government because there is a belief that he is suffering from some mental or nervous disorder that may have some connection with his military service. He is a man about thirty-two years old who aside from a somewhat shy attitude and apparent lack of interest in his surroundings shows nothing that is unusual. A careful physical and neurologic examination reveals no serious abnormalities. The father of the man tells us that there have been a number of instances of mental disorders among his family. An aunt was feeble-minded, one of this grandmothers was an epileptic, and the other was insane. As a child he was physically healthy, but he was always stubborn and hard to manage. We know little about his schooling. At thirteen he ran away from home and went to his grandparents in Canada. From then on he was sometimes in Canada and sometimes with his parents in Michigan. His only employment seems to have been at farm labor, and from what we can learn he was regarded as quite efficient in simple work. He was, however, easily dissatisfied and frequently changed his position. He enlisted in the Canadian Army in 1914 and was at once sent overseas. Official information states that he was almost at once returned to Canada as unfit for service. We have been unable to find out anything about his life from then until 1918, except as he gives it in his own narrative. There is some evidence that he was in the American Army in 1916 and was discharged in 1918. Part of this time he may have been in a hospital. The official records state that he says he was injured in France by falling from an airplane, but when one hears his own account of his experiences one questions the accuracy of this. Although he says that he was shot through the body and fell, breaking his shoulder and several ribs, one finds no scars that bear this out, or evidences of fractures.

His attitude on the wards is one of good-natured indifference

to his hospital confinement. He usually keeps by himself, talks but little except when one converses with him, and then he tells in a most natural manner of strange and unbelievable experiences in the recent war and even going back to his fourteenth year. At that time he ran away from home and, lying about his age, was taken into the British Army and had service in the Boer War. There he was a scout and was so brave and did so many heroic acts that he was honored by being taken to England and presented to the King. He was honored by being placed upon the throne and they called him Prince Arthur. As soon as the recent war broke out he was sent overseas and was again given important positions in the British Army and was made a general. He then was assigned to recruiting duty and, returning to America, he was placed in command of the Detroit Battalions. He took them overseas and during the remainder of the war he was always in conspicuous places and doing heroic deeds.

In spite of absurdities and obvious impossibilities in his narrative he seems to believe he is speaking the truth. He never argues on a point, and sometimes, when an absurdity is too glaring, he will modify his statements, but usually the story is repeated in much the same form.

From examinations and interviews since he has been in the hospital, we find that he has at all times been clear in his understanding. He knows he is in a hospital for mental disorders, but cannot understand why he should have been brought here, as he is sure that there is nothing wrong with his mind. He thinks he may be a little nervous from his trying war experiences and he does not think he has entirely gotten over the effects of his fall from the airplane. As one observes him on the ward he seems to lack a normal initiative and is content to sit all day in a chair without interesting himself in reading or doing any of the routine tasks. His simplicity of mind and the faulty use of words that is always apparent in his conversation suggested that there might be, in addition to other mental abnormalities, a rather marked degree of mental deficiency. A systematic test for intelligence shows that he has a mind about equal to that of the average child of nine years of age.

As one reviews the main facts in the history of this man and what has been observed in his hospital residence, it becomes apparent that he has always had traits and qualities that distinguish him as being different from the average man. While there is a defect in those qualities that we regard as necessary for intelligence, there are also present an excessively lively imagination, an unstable personality as evidenced in his lack of sustained purpose and his difficulties in adjusting himself to life either at home or with relatives. Thus we have in this individual both mental deficiency and a psychopathic constitution. These two qualities are not infrequently combined, and when this occurs the social problems of the indivudial become especially serious.

As a type he belongs in the group described by Kraepelin as that of the pathologic liars and swindlers. The distinguishing feature of this group is the extraordinary prominence of the imagination and the tendency to be led away by this. The source of this lies in the emotional needs of the personality, and in their productions their own self has a conspicuous part. This symptom of pathologic lying is observed not only in those of psychopathic constitution but also occurs in some forms of hysteria. It has been described as a special syndrome by Delbrück under the designation of "pseudologia phantastica." It occurs as an intermixture of apparently deliberate lying with imaginations that are actually believed. It is closely allied to traits of character seen in swindlers who utilize these to secure personal gain. Not infrequently the statements and behavior of individuals of this class has a medicolegal importance. These may involve charges of sexual assaults or accusations of crimes against innocent parties.

The treatment of adults of this type of psychopathic constitution is not encouraging. Our patient, we have been considering, has improved somewhat in physical health since he has been in the hospital, but his abnormal traits and his general mental attitude remain the same. He now wishes to leave the hospital and go to a relative in Canada where he can do farm work. This seems to us a very practical way of life for him and we shall soon discharge him from the hospital.

Traits of this type are commonly observed in children. While normally imagination and easy inclinations to lie and deceive are mental characteristics of phases of the child's mental life, they are often excessive, and unless checked have possibilities of shaping the personality in unhealthy ways. They should in these instances be clearly appreciated and given especial attention. The treatment lies in a well-planned regulation of their lives and work and instruction aimed at securing a necessary discrimination between the fanciful and the real. In choosing their life-work one should avoid those occupations in which the imagination has a prominent part.

One might present in this discussion other psychopathic individuals whose abnormalities are of such specific qualities or combinations as to be classed as types. One might mention those psychopaths whose abnormal traits appear in the form of impulsive tendencies toward the immoderate spending of money, or those who are commonly called spendthrifts. In others the impulses lead to periodic severe intoxication or characteristics that we recognize as dipsomania. There are those whose irritability and dissatisfaction with their own personal relation to life leads to their becoming bitter against social customs and to the restraints and conventions that regulate our human relations. They become antisocial in their interests and behavior and add to the numbers that are ever seeking for the destruction of orderly progress.

Another not infrequent type of psychopathic personality is the querulent. Such individuals have a feeling that they are being illegally deprived of property or imagined inheritances. To secure this they undertake endless litigation and from their unsuccessful efforts in this they develop a bitter attitude against their friends, the courts, and whoever has had a part in their imagined difficulties.

As a general rule the psychopathic personality is easily differentiated from the normal. To group all individuals of psychopathic constitution into specific types is not easy or satisfactory. Psychopathic traits occur in such intermixtures and varying prominence of this or that abnormality that the feasibility of

too rigid and extensive classifying becomes doubtful. It has conveniences for those who deal with problems of behavior in social relations, but it has at the present time great clinical and psychologic difficulties. As a social problem the psychopathic personality is a serious disturbing influence in the home and life of the community. His frequent conflict with the laws and his impaired capacity to adjust himself adequately to the regulations under which we must live makes it necessary that his constitutional weakness be appreciated by all those who administer the laws or deal with problems of behavior.

The treatment of the psychopathic individual must be based upon the fundamental proposition that we must deal with a disorder of the constitution of the personality. It is not a matter of a disease engrafted in a previously healthy individual, but rather with the gradual malformation of a character into an abnormal balancing of feelings in relation with behavior. The problem is more difficult to deal with when we are concerned with the psychopath of adult years when traits and qualities have become firmly fixed. It thus becomes important to recognize tendencies and abnormalities as early as possible in the life of the individual. This is often possible in the earliest years of childhood or even in infancy. The nervous manifestations of childhood are commonly traits that stand in intimate relation with the development of a psychopathic character. It is in this period that the physician has a special responsibility. He should know how to distinguish abnormal qualities and be able to instruct the parents in ways of dealing with these intelligently.

Whether we are concerned with the psychopathic child or adult, specific lines of treatment are difficult to lay down. Whatever is impairing the physical health of the individual should receive careful attention. The training of the psychopathic child should be directed toward securing simplicity of life, quiet surroundings, and self-restraint. The environment should be such as to make its life as free as possible from all that will produce unusual stimulation. Care should be exercised to guard against early interest in sex matters, as these always have re-

lations that bring to the individual excessive emotional stresses and are powerful influences in the shaping of character.

The treatment of the psychopath of adult years must be directed toward securing as good a measure of physical health as possible. Environment should be arranged with an appreciation of the limited and special incapacities for adjustment that are characteristic of the psychopath. One must endeavor to bring the individual to exercise the greatest possible self-control and to govern his life with an intelligent appreciation of those influences that he cannot adequatley handle. Unfortunately, too often treatment brings no improvement and the individual continues as a social menace. One must recognize that in these instances it is best for the protection of social order that the psychopath of criminal tendencies be confined in institutions for the mentally abnormal or in reformatories or prisons. Judges must appreciate the limited capacities that the psychopathic criminal has for controlling his behavior and that the psychopaths make up a large proportion of the repeated offenders with whom he is continually dealing. The determination of the penalties should be very largely determined by the mental constitution of the offender, and this is often such as to make long periods of confinement advisable. The information necessary to determine this can best be furnished by the physician acting as advisor to the court.

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CHOREA AND CHOREIFORM AFFECTIONS WITH SPECIAL REFERENCE TO ETIOLOGY

CHOREA is a term used either as the name of a disease or as applied to any condition in which asymmetric, arhythmic, purposeless, and involuntary movements constitute the chief or perhaps the only clinical findings. Since the "disease" chorea consists of these bizarre movements together with their effects on speech, breathing, walking, and other purposeful acts, it is evident that all the choreiform syndromes have a close relationship. The chronic choreas and the acute types show practically identical disturbances in movements. The modern point of view insists that this result is due to the fact that in all choreic cases there is a disturbance of function of the same portion of the central nervous system. In other words, the choreic movements indicate that a certain portion, a definite locale in the brain, has been effected and do not indicate in any way the cause of that localized lesion. There is sufficient evidence to warrant the acceptance of the theory that a portion of the lenticula is the special region which is affected in all cases of chorea, although this cannot be taken as entirely proved. It may be remembered that Bonnhoeffer and also Halban and Infeld placed the lesion in chorea in the region of the nucleus dentatus, or its cerebellar connections. On the other hand, numerous authors have insisted on a cortical localization. Anton[1] was the first to report a case of chorea in which the necropy showed lesions in both lenticular nuclei. Variations in the extent and severity of the choreic movements may be considered to be due to similar variations in the extent and character of the lesions.

[1] Jahrb. f. Psych., 1895, p. 610.

Clinical studies of choreic affections show that there probably is considerable and important differences in the etiology of the disorder even though the brain lesion is localized. As illustrative of that opinion I would cite briefly the findings in 24 cases that I have had an opportunity to study during the year ending July 1, 1922.

Of these, 11 cases were classified as Sydenham's chorea, and the ages of these patients ranged from seven to eighteen years. There were cases of chronic type in which the probable etiologic factor was hereditary syphilis. The ages of these were twelve, fourteen, and sixteen years. One case in a patient aged thirty years was diagnosed as chorea "des degenereé," and another case in a patient aged eighteen was similarly diagnosed, although the patient was pregnant, and hence the diagnosis of chorea of pregnancy was also considered. One case, in a patient aged twenty-eight years, was typically chorea of pregnancy. In four cases the chorea followed an attack of epidemic encephalitis; these patients were aged twenty-six, thirty-three, thirty-six, and fifty years. One was a patient with Huntington's (hereditary) chorea aged forty-three years. One was a case of chronic chorea in a patient aged thirty-six years who had evidence of cerebrospinal syphilis. And one was a patient aged sixty-eight years with the senile chorea of Brissaud. It is not necessary to illustrate the ordinary type of chorea seen in the 11 cases by relating the details of each case. They were all young people. Although this type of chorea may occur in adults, it is rare. The family histories of the patients were negative or practically so. They were usually of ordinary previous health with nothing noteworthy in the previous medical history except perhaps some history of "rheumatism" or tonsillitis. The first symptom noted was either "nervousness" or "jerking," and this usually grew worse gradually. The jerking was the typical choreic type—involuntary, purposeless, irregular, and asymmetric. Aside from the jerking the use of the limbs was not impaired.

The so-called "paralytic chorea," in which one extremity is extremely weak, is a rare disorder. I described 2 such cases in 1905 and have seen several since that time, but none were seen in the above series.

The tendon and skin reflexes were normal in all of these cases. The sensory tests were negative. Usually speech was somewhat impaired and close observation showed irregularities in breathing. The interference with the gait depended on the severity of the movements, and these varied from those which were so severe as to throw the patient violently about the bed, to those so slight that the only way they could be noted was to hold the patient on examiner's knee so that the movements could be felt when perhaps it could not be seen. The ocular fundi were negative, the pupils were normal, and the special senses normal. For the most part they showed little if any mental change. The Wassermann test on the blood was negative. The spinal fluid showed no increase in cells. A normal amount of albumin. No globulin (Pandi test) and a practically flat gold-sol reaction. The leukocyte count was slightly elevated in some cases, but not constantly. In some cases there was a moderate anemia. Endocarditis or some evidence of valvular heart trouble was present in 7 of these cases, but none of them showed decompensation at any time. Focal infections were carefully looked for and removed if found, but they were found only in 5 of these cases, and their removal did not cause any immediate improvement. In 4 cases the tonsils had been removed before the patients were brought to the hospital. In none of these cases was there any reason to believe that congenital syphilis played a part in the cause of the disease. Patients with Sydenham's chorea recover, although the duration of the disease is difficult to predict. The majority recovered while in the hospital. When there is a definite valvular heart lesion it will likely be permanent.

The treatment of these patients consisted of rest in bed, more or less isolation, and the administration of Fowler's solution in 3- to 5-drop doses three times a day. Occasionally the syrup of the iodid of iron in 10-drop doses three times a day was also given. In other cases and in some of these cases I tried various methods of treatment, but without finding any of greater value. The association of chorea and rheumatism suggested a trial of salicylates, or aspirin, etc., but they seemed of little use. Apo-

morphin in small doses acted as a sedative in severe cases. Injection of emetin were tried because of its supposed antiseptic effect, but the results were practically negative. In view of the favorable effect of Fowler's solution, arsenic in other forms was tried—sodium cacodylate, salvarsan in both large and small doses, etc., but these had little effect. The salvarsan especially seemed to do harm rather than good, and this agrees with my experience that large doses of arsenic are not desirable. I have found that Fowler's solution pushed to the limit of tolerance may do harm. One of this series of cases was treated with daily injections of mercury succinimid for nearly a month. He was a boy aged fourteen years. His family history was negative. He had had scarlet fever and also rheumatism. His choreic movements had begun three weeks before his admission to the hospital. The neurologic examination was negative except for the irregular involuntary movements in all parts of the body. His tonsils were removed, but no improvement followed. The subsequent injections caused no change in his condition. He recovered, however, under the routine treatment outlined above.

The discussion of the relation of chorea to syphilis has evoked marked differences of opinion. For instance, Foti[1] found inherited syphilis present in 13 out of 17 cases, and says that it was probably present in 3 others. He therefore concludes that inherited syphilis is the principal factor in the etiology of chorea. Milan[2] reported cases of chorea occurring in 2 brothers—one had stigmata of hereditary syphilis, the other was not stigmatized, but had a positive Wassermann reaction. Dufour, Apert and Roulcard, Chevron, and others have championed this view of the etiology of chorea. On the other hand, Koplik,[3] in a discussion on the etiologic relationship of syphilis to the chorea of Sydenham, concludes that syphilis is not a cause of chorea. My opinion agrees with that expressed by Dufour, Thiers, and Charbon[4] in their study on the etiology of chorea that there are

[1] Pediatria, September, 1919, p. 579.
[2] Bull. de la Soc. Med. de Hôp., Paris, February 27, 1914.
[3] Amer. Jour. Obstet., 1915, p. 547.
[4] Bull. de la Soc. Med. de Hôp., Paris, 1913, p. 448.

two kinds of chorea—a syphilitic and a non-syphilitic. Certainly in the 11 cases that I have summarized above there were no evidences of syphilis found, although they were carefully studied from that point of view. I have seen 3 cases this year in which the etiology of the chorea was probably inherited syphilis.

Case 1. Chorea on Congenital Luetic Basis, Treatment with Mercury and Iodid. Cured.—Age sixteen. Two brothers died in infancy and another aged twelve is deaf, but never had a "running ear." The father and mother were said to be well, but were not available for examination. The patient had interstitial keratitis at the age of six and her right femur was broken at the age of nine. The choreic movements began in April, 1919. The examination showed marked, generalized choreic movements. Mentally she appeared sluggish. Scars of interstitial keratitis were present. The postcervical glands were enlarged. The pupils and extra-ocular movements were normal. There were no paralysis or sensory changes. The tendon reflexes were normal. The clinical examination as well as the orthodiagram showed a pulmonary stenosis of congenital type. The Wassermann test on the blood was negative and the spinal fluid showed only 1 cell per cubic millimeter; no increase in albumin and was negative to the Wassermann, gold sol, and mastic tests.

A second case of this kind was so similar that it is not worth quoting in detail. In this case, however, the father gave a history of syphilitic infection, practically untreated. This patient also recovered under antiluetic therapy.

The following case is difficult to classify, but I would be inclined to diagnose it as on a syphilitic basis, although the biologic reactions for syphilis were negative.

Case II. Chorea Recurring Each Spring.—Girl aged fourteen. Mother has aortitis, but 6 brothers and sisters are well. When the patient was a baby there was delay in learning to walk, and the mother was told by her doctor that it was due to "bad blood." For the past five years she has had choreic movements beginning each spring and lasting until midsummer. There was no history

of rheumatism. The physical examination showed that she was well nourished and the heart and lungs were normal. The pupils were irregular in outline, but reacted normally to light and in accommodation. The tendon reflexes were normal and there were no sensory changes. Mentally she was normal in all respects. The Wassermann test on the blood was negative, but she had Hutchinson's teeth and Sabauraud tubercle. No localized foci of infection were found; the tonsils had been removed the year before. The attack which was observed began in March, 1922 and was recovered from about August 1st.

Comby[1] examined 39 cases of chorea with the Wassermann test and found it positive in 11, negative in 28. He also tested the same patients with tuberclin, and found a positive result in 24 cases. He therefore asks why one should attribute the affection to syphilis rather than to tuberculosis. This question clearly brings out the important point that in distinguishing between chorea as an acute infectious disease and the choreiform affections due to syphilis the biologic reactions cannot be used alone, but more emphasis must be placed on the clinical features of the case, especially the history and the presence of other evidences of syphilis, and perhaps, most emphatically, the result of treatment.

A syphilitic encephalitis may produce symptoms identical with those caused by encephalitis of other infectious origin if the lesions are similarly located. There is, of course, no reason why acquired syphilis in an adult should not invoke the same brain areas as are involved in ordinary chorea, and cause a similar clinical picture. In the following case this seemed the most probable diagnosis. In some respects the case resembled Huntington's chorea, but the family history was negative. There was no evidence of paresis, although the presence of choreiform movements in cases of paresis has been frequently described.

Case III. Chorea of Chronic Type in an Adult Female whose Husband was Syphilitic and Who at First Gave Positive Biologic Tests, but Later Negative. — The patient was a housewife,

[1] Bull. de la Soc. Med. de Hôp., Paris, 1915, p. 666.

thirty-six years old, admitted to the hospital of the University of Michigan April 30, 1922 and readmitted September 1, 1922. Her chief complaint was of generalized choreiform movements, which had begun three or four years before her admission to the hospital.

Her family history, confirmed by her brother, was negative for any nervous or mental disorder. She was married at the age of twenty-two years. Her husband was being treated for syphilis in the Hospital of the University of Michigan at the time she was admitted, and the Wassermann reaction on his blood was strongly positive. She had 2 living children and had had two miscarriages. Aside from the ordinary diseases of childhood she had never been ill.

The examination showed a fairly well-nourished woman with choreic movements of the face and extremities. The gait was slow, but not staggering, There was no intention tremor or ataxia. Speech was definitely involved. The tendon reflexes were normal. The pupils were equal and reacted to light and in accommodation. There were no extra-ocular palsies and no nystagmus. The ocular fundi were reported negative by the opthalmologist (Dr. W. Parker). The gynecologist (Dr. Peterson) reported finding an old cervical laceration. A set of dental films showed an abscess at the root of a first molar tooth. This was removed. The nose and throat examination was negative. The general physical examination of the heart, lungs, and abdomen showed nothing abnormal. The blood-count showed 3,650,000 red blood-cells; 5300 white blood-cells, and a hemoglobin of 63 per cent. The differential white cell count showed 69 per cent. polymorphonuclears and 25 per cent. lymphocytes about evenly divided between large and small. The Wassermann test on the blood was negative. The spinal fluid showed 1 cell per cubic millimeter, no increase in albumin or globulin, a negative Wassermann test, and no changes by the gold sol and mastic tests.

The physician who referred her to the hospital had found the Wassermann reaction on her blood to be strongly positive, and had given her four intravenous injections of neosalvarsan

and twelve of mercury in addition to potassium iodid, without causing any definite change in her symptoms.

During her stay in the hospital of about two months' duration she was treated by rest, isolation, psychotherapy, and small doses of Fowler's solution, but on leaving her condition was unchanged.

Her examination on her readmission four months later showed practically the same findings as before, and a negative Wassermann reaction on the blood.

Huntington's (hereditary) chorea may be complicated by the presence of syphilitic infection.

Case IV. Hereditary Chorea Complicated by Syphilis Probably No Effect on the Chorea.—Male, aged forty-three years. The patient began to have the choreic movements at thirty-eight years of age. He had a chancre at the age of thirty-four years and now has a positive Wassermann reaction on the blood. His examination showed marked choreic movements. He showed evident mental deterioration and speech was interfered with. The pupils and tendon reflexes were normal and there were signs of cerebrospinal syphilis.

His family history was significant. His father is well. His mother, his mother's mother, and his mother's brother have chronic chorea, and are in insane asylums in Michigan with the diagnosis of Huntington's chorea. He also had a sister and a cousin who had chorea and died insane. In this case it appears most likely that the syphilis had nothing to do with the development of the chorea and was merely a complication. The effects of treatment of the syphilis on the chorea would have been interesting, but the patient could not be treated in the hospital on account of his mental condition. The above case resembles the one reported by Urechia and Rusdea[1] under the title "Syphilitic Chronic Chorea." Their patient was fifty-six years old and his father had had chorea. In addition to the choreic movements he showed unequal pupils with lost light reflexes, increased knee-jerks, lost Achilles' reflexes, and marked changes in the

[1] Revue Neurologique, May, 1922, p. 153.

spinal fluid. Evidently in this case there was a cerebrospinal syphilis, but in view of the family history one may doubt if this was the cause of the chorea. Antiluetic treatment apparently had no effect.

An interesting type of chorea is that which has been called "chorea des degenereé." These patients are usually of constitutional psychopathic type and frequently show marked anatomic signs of deviation. Under stress of circumstances or in certain environments they develop typical choreic movements. These attacks of "chorea" last as long as the patient is in that environment and recur if the patient returns to that environment. The diagnosis of chorea may be open to some criticism on the ground that there is no organic lesion present, but, on the other hand, the movements are quite typical, and it seems possible that these patients suffer from a maldevelopment of the same regions of the brain which in ordinary chorea is found to be diseased. An example of this condition:

Case V. Chorea of Degeneracy.—The patient was a woman aged twenty-eight. The family history included both epilepsy and insanity, but there was no history of chorea. Her previous medical history showed the ordinary diseases of childhood, but no history of injury and no definite history of rheumatism.

It was said that at about the age of eight years it was first noticed that if she was punished she would develop jerking movements of the entire body including the face. These jerking movements would last for from twenty-four hours to three or four days, disappearing gradually. At about the age of twelve she went to a strange school and at this time developed choreiform movements which lasted about a month, but ceased shortly after leaving this school.

Her parents were dead and she lived with an aunt. At the time she was first examined she had had choreic movements for nearly a year, but otherwise seemed to be in fair health. After being in the hospital a few days the movements disappeared, but on returning to her former home they returned. She went on a visit, and while on this visit had very little, if any, jerking,

but the movements again appeared when she returned to her home.

The examination of the patient showed a well-developed individual with numerous stigmata of deviation. There were no definite evidences of hereditary syphilis. The general physical condition was good. The examination of the heart was entirely negative. No foci of infection was discovered. The movements were typically choreic in type and involved the face and all four extremities. There was some slight difficulty in walking and an occasional difficulty in speech. The tendon reflexes were normal. There were no sensory changes and the blood and spinal fluid Wassermann was negative.

The diagnosis of the above case might be a multiple tic or hysteria, but the character of the movements was not tic-like, and the patient did not seem amenable to suggestive therapy.

A somewhat similar case was complicated by pregnancy.

Case VI. Chronic Chorea Complicated by Pregnancy.—A girl aged eighteen years was examined in the hospital, showing generalized choreic movements. Her mother had had a "stroke" at the age of thirty-six years. Her father died of diabetes. There was no family history of chorea. She had had the ordinary diseases of childhood and had lived a rather irregular life. She began having jerking movements at about fourteen years of age. These subsequently ceased. She was delivered of a baby about two months before she was examined, and she stated the jerking movements had developed during the pregnancy. When examined she appeared fairly well nourished. There was a marked strabismus. There were generalized choreic movements, increased tendon reflexes, and quite marked stigmata of deviation. There were no sensory changes and the Wassermann test on the blood and spinal fluid was negative. There were no evidences of infection and no endocarditis.

I first thought this was a case of "chorea of pregnancy," but the history of a previous attack and the persistence of the chorea after the termination of the pregnancy makes it

more likely a case of chronic chorea. A hereditary syphilitic basis might also be considered in this case.

The cases of chorea following epidemic encephalitis are an extremely interesting class of cases. Apparently they occur at a somewhat later age than the other types of chorea and are either associated with or a sequel of encephalitis. So much has been written on this subject in the last few years that it is unnecessary to relate these cases in detail. From my experience, however, I would draw the following conclusions respecting them:

First, that the severity of the initial disease has no bearing on the severity of the choreiform effection that may follow.

Second, that the prognosis for recovery in these cases is not good.

Third, that I know of no treatment which seems markedly beneficial for these cases.

Case VII. Senile Chorea—Brissaud.—This patient was sixty-eight years old. There was no family history of chorea. She had been a hard-working farmer's wife, considerably exposed to weather, and had raised a family of 8 children. Her choreiform movements had begun about a year and a half before she was examined in the hospital. They were not especially severe, though she occasionally dropped things out of her hand. The movements were more marked on the right side than the left. The tendon reflexes were slightly increased on the right side. The ocular fundi were negative except for some signs of arteriosclerosis. She was mentally quite normal except for some evidence of senility. The pupils were normal and reacted well to light and in accommodation. Her general physical condition was fairly good.

It seems entirely possible that in such cases there are small areas of softening in the lenticular nuclei, possibly the result of arteriosclerosis.

It must be submitted, therefore, that the etiology of chorea, so far as the common causable factor is concerned, varies considerably in different cases. Possibly the majority of cases are

due to a chronic infection with possibly a focal origin, but it is important to realize that hereditary syphilis, likewise acquired syphilis and also toxic factors, may be the cause in some cases. An appropriate treatment of chorea is not possible without a clear understanding of the etiologic factor, and this etiologic factor is better determined by the critical aspects of the case than by biologic reactions.

CLINIC OF DR. LOUIS D. STERN

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A CASE OF SPLENOMEGALY WITH ACHOLURIC JAUNDICE —DIAGNOSIS, TREATMENT, AND CLINICAL CURE

THE patient, twenty-three years of age, a barber by occupation, entered the University Hospital for the treatment of a superficial ulcer of the left ankle which had resisted all local remedial measures for the preceding seven weeks. It is worthy of note that he had no complaints directly referable to the constitutional disturbance which was subsequently found to be the underlying cause of his trouble. His hereditary and personal antecedents had no bearing upon the case except in one particular, namely, that there had been a definite yellowish discoloration of his skin and eyeballs, mild but persistent, for eleven years. It caused him no inconvenience at any time, and was not associated with any pruritus, abdominal pain, acholic stools, or any significant gastro-intestinal disturbance. In short, his trouble, so far as he was concerned, was simply the ulcer on his ankle.

Examination at the time of entrance showed a young man of rather poor physique, weighing 110 pounds. There was a very evident icteric tint of the skin over the entire body and of the scleræ, but not to the degree usually seen in obstructive jaundice. The mucous membranes of the eyes and mouth were plainly paler than normal. The lymph-glands of the neck were enlarged to bean size, hard, discrete, not tender. In the chest the left border of the heart was found to be 13 cm. from the midline, and a short, rough, systolic murmur was heard over the precordium, loudest at the pulmonic area. The lung signs were normal. In the abdomen a mass was felt in the upper left quadrant, occupying a space almost to the midline

and down to the level of the umbilicus. It was hard, smooth, not tender, descended with inspiration, and had a definite notch on its medial edge—evidently a very much enlarged spleen. The edge of the liver was also easily palpable just below the right rib margin. On the inner surface of the left ankle, posterior to the malleolus, was a superficial ulceration about 2 inches in size, with a necrotic, painful, and partially healed base, and an irregular, shelving border, surrounded by a livid zone of erythema—apparently an indolent ulcer without any specific infectious cause. The reflexes were all normal.

Urinalysis revealed only one abnormality, which was the constant presence of the blood-derived pigment urobilinogen. Tests for bile were persistently negative. The blood-pressure was normal—124 systolic and 80 diastolic. The blood Wassermann was negative. Microscopic study of the blood showed important changes in the nature of a moderately severe secondary anemia. The hemoglobin was 55 per cent., the red cells numbered 3,830,000, white cells 8600, with a practically normal differential picture.

It is evident that these physical and laboratory findings are not to be readily explained on the basis of the complaint of a sore ankle. The cardiac enlargement, subsequently confirmed by orthodiagram, together with the rough systolic murmur in the pulmonic area, are to be interpreted as signs of some degree of pulmonary stenosis, probably congenital in origin, but this defect has never caused the patient any circulatory embarrassment and must, therefore, be passed over as an incidental, although interesting, finding. The jaundice of eleven years' duration, the enlarged liver and greatly enlarged spleen, the products of red blood-cell destruction in the urine, and the marked anemia, with practically no subjective disturbance, combine to form a clinical picture which requires an adequate explanation.

Splenic enlargement of this degree is encountered in relatively few diseases. In a young individual such as this patient, Banti's disease, or splenic anemia, is by far the most frequent cause, but it is seldom accompanied by jaundice, and then only in the late

stage, when there are also signs of portal obstruction with ascites and bleeding from the gastro-intestinal tract. Moreover, the blood-picture is characterized by a leukopenia with relative lymphocytosis—bone-marrow depression—which is not present here.

Certain affections of the blood-forming tissues are characteristically accompanied by splenic enlargement, notably the leukemias, and any splenomegaly of this degree should raise the question of primary blood disease. Cell counts and cell morphology, however, show none of the typical changes; and the diagnosis of any of the usual blood disturbances is, therefore, eliminated.

The jaundice here manifested is of a rather peculiar variety in that there is no bile in the urine and no absence of bile in the intestine. In other words, it is not the ordinary obstructive type, and therefore cannot be explained on the basis of any of the causes of obstructive jaundice. The diagnosis of hepatic cirrhosis, which may produce both splenomegaly and anemia, cannot be more than momentarily entertained because the jaundice accompanying it is of the obstructive sort.

This so-called acholuric jaundice—yellow skin without bile in the urine—occurs under conditions in which there is an increased destruction of red blood-cells with increased amount of resulting blood-derived pigment in the circulation. It is encountered perhaps most commonly, but not exclusively, in pernicious anemia where the blood plasma and the skin both show the characteristic color. The products of the red cell destruction are eliminated through the kidneys and liver, and they may be detected in greatly increased amount in both the urine and the duodenal contents. In the urine the simplest qualitative test is for urobilinogen, and this substance was constantly found in large amount in this case.

There is a condition presenting the features of splenomegaly with acholuric jaundice which is occasionally encountered in any large clinic, and is met with in this hospital perhaps once in a year. The patients are children or young adults, and the signs of disease revealed by examination are altogether out of pro-

TABLE I. DETAILED BLOOD FINDINGS

Date.	Treatment.	Hgbn. per cent. (Sahli).	Red blood-cells in millions.	Reticulated red blood-cells, per cent.	White blood-cells in thousands.	Differential							Smear.
						Polys.	Eosin.	Baso.	L. lym.	S. lym.	Mono.	Trans.	
4/15	.....	55	3.83	9.0	8.6	71	4	1	11	8	3	2	Microcytosis; platelets normal.
4/18	x-Ray.	50	3.2		14.1	64	.....	2	19	8	7		
5/7	15 exposures over spleen.	50	3.3	12.5	13.8	75	3	.....	12	7	2	1	Same.
5/13	5/2 to 6/23.	48	3.23	21.5	5.6	70	3	1	7	13	3	3	Microcytosis; platelets decreased; rare normoblast.
6/2	.....	45	2.93	15.2	7.3	85	2	.....	8	2	2	1	Same. Young polys.
6/26	Transfusion 600 c.c.												
7/8	.....	44	3.05	12.6	8.6	72	2	1	11	6	6	2	Microcytosis; platelets normal; no normoblasts.
7/15	Transfusion 500 c.c.												
7/23	.....	45	2.92	.....	5.6								
7/27	Transfusion 500 c.c.												
7/29	Splenectomy.												
8/1	.....	55	3.84	6.2	8.9	90	.....	.....	1	3	5	1	Microcytosis; platelets increased; young polys.; no blasts.
8/10	.....	63	4.5	0.5	9.4	77	2	1	8	.....	8	4	Same.
8/19	.....	72	4.3	.....	14.0	80	.....	.....	12	5	3		
8/28	.....	70	4.64	.....	13.9								
9/9	.....	76	4.54	.....	10.7	69	.....	.....	6	19	6		
9/26	.....	80	5.02	.....	14.1	79	2	.....	4	11	4		
10/4	.....	80	4.8	1.0	15.2	72	6	.....	11	1	8	2	Less microcytosis; platelets increased.

portion to the complaints. In the words of one of the early observers of this disease, they are "more icteric than sick." Frequently, as in the case under discussion, they seek medical advice because of some minor ailment not directly connected with the major disease. The diagnosis depends upon the combination of certain clinical and laboratory findings which make up a distinctive picture. These include enlargement of the spleen, usually to a marked degree, slight enlargement of the liver, acholuric jaundice with red blood-cell disintegration products in the urine, and a varying degree of anemia of the secondary type associated with two other notable abnormalities of the blood.

These two blood changes are rather easily demonstrated; and in hospital practice may be investigated routinely in cases of anemia. The first of these is a greatly increased number of young or reticulated red blood-cells—reticulocytes. They are distinguished in a film of fresh blood by the presence of an intracellular, granulofilamentous network when stained by a vital stain. Ordinary blood-stains do not show this. These cells are considered as relatively young erythrocytes, and are placed between the nucleated forms and the mature circulating cells in the cycle of development. They are present in all normal blood in small proportion—about 1 per cent. or a trifle less of the total number of red cells. An increase in their number occurs with increased blood regeneration from any cause. Ordinarily this amounts to not more than 3 or 4 per cent. In the disease under consideration it may be as high as 15 or 20 per cent., and when so increased it is a diagnostic sign.

The second of these blood changes is an increased fragility of the red blood-corpuscles when exposed to graded concentrations of hypotonic sodium chlorid solution. If a freshly drawn drop of normal blood is placed in each of a series of small serologic tubes containing equal volumes of sodium chlorid solution, which range in concentration from about 0.25 to 0.50 per cent., the blood will show varying degrees of hemolysis due to the osmotic action of the salt. The tubes containing the highest percentages of salt will show complete sedimentation of the

corpuscles and a clear, colorless supernatant fluid. At a concentration of 0.42 to 0.46 per cent. the supernatant will be faintly tinged with hemoglobin, indicating disintegration of some of the cells; and in each successive tube down the series this red color will be deeper, with fewer and fewer uninjured corpuscles at the bottom. At a concentration of about 0.30 to 0.34 per cent. there will be complete disintegration of the cells with none at the bottom of the tube, indicating complete hemolysis. When the points at which hemolysis begins and is complete correspond to higher concentrations of salt than normally, there is said to be increased red cell fragility. This change is diagnostic of the disease under consideration.

In this case all of the cardinal features described were present and the diagnosis of hemolytic jaundice was established. Two varieties of this affection are to be distinguished—a congenital and an acquired form—and this distinction is of importance in connection with prognosis and treatment. The congenital form is usually present from early childhood, and is mild as to symptoms, just as in the case described. It is exceedingly chronic, and even if left untreated its duration is measured in years, and the outcome usually depends upon some intercurrent affection. The acquired form becomes manifest later in life and it is, in general, more severe, with greater anemia and debility.

The treatment of the disease in either form consists of the removal of the enlarged spleen. In the congenital cases this may be expected to result in a permanent cure. In the acquired, a cure is not so certain, but marked benefit and especially improvement in the anemia usually results.

In the present case it was considered that *x*-ray treatment of the spleen might possibly reduce it somewhat in size and render its removal easier. But Roentgen therapy extending over a period of about seven weeks, and applied in a manner similar to that used for cases of myelogenous leukemia, was without any effect. The spleen remained the same in size and the other features of the disease did not change. The treatment was adequate in amount and, indeed, on one occasion slight symptoms of Roentgen sickness occurred.

Following this unsuccessful treatment the patient was transfused on three occasions with 500 to 600 c.c. of suitable matched blood so as to decrease the anemia before operation. The effect of the first two of these transfusions may be seen in Table I.

After twelve days in the first instance and eight days in the second the general blood level was the same as before. Excessive blood destruction being a cardinal feature of the disease, it could not be expected that transfusion would have any lasting effects.

Two days after the third transfusion the spleen was removed by Dr. Hugh Cabot. It was very markedly enlarged, without adhesions, and microscopically showed chronic passive congestion, diffuse fibrosis, and lymphoid atrophy. The liver was not grossly abnormal and the gall-bladder contained no stones, although gall-stones have been reported as occurring in over half of the cases of this disease. The patient made an uneventful recovery from the operation, and the subsequent improvement in his anemia may be noted in the preceding table.

Certain typical changes in this case following the splenectomy throw some interesting light on the pathology of the disease. In the first place, there was rapid and effective blood regeneration immediately after operation, and the anemia almost disappeared after two months. This is in striking contrast to the comparatively fixed blood level manifested for the three months preceding. Moreover, the reticulocytes dropped very rapidly from a high percentage to normal, indicating that the bone-marrow was no longer working under increased pressure to supply circulating red cells. The removal of the abnormally functioning spleen evidently interrupted the excessive degree of blood destruction, and the erythropoietic tissues were enabled to make good the deficit then existing. Within two weeks after operation the yellow color disappeared from the skin and the urobilinogen disappeared from the urine, indicating again that excessive blood destruction had ceased.

Incidentally, the ulcer on the patient's ankle, which had shown very little improvement under careful treatment for three

months preceding operation, was completely healed two weeks afterward as the anemia improved, and remained healed.

The spleen is thus seen to be responsible for most of the pathology in this disease, but there is evidence to show that it is not entirely to blame. As previously mentioned, some cases of the acquired type are not cured by splenectomy. In practically all cases the increased red cell fragility persists in spite of the removal of the spleen, and this feature has been noted in the blood for years following.

TABLE II. RED BLOOD-CELL FRAGILITY

Date.	Hemolysis in terms of 0/0 NaCl solution			
	Patient.		Normal.	
	Start.	Complete.	Start.	Complete.
5/13	.56	.42	.46	.36
6/ 2	.54	.42	.42	.32
7/ 8	.60	.38	.40	.28
7/29	Splenectomy			
8/ 1	.48	.36	.44	.30
8/10	.52	.34	.44	.32
8/18	.48	.32	.44	.32
8/26	.48	.30	.46	.32
9/ 1	.52	.30	.46	.30
9/ 8	.56	.30	.44	.32
9/16	.58	.30	.46	.36
10/ 4	.52	.38	.44	.34

Table II contains the record of successive tests of the red cell fragility of the patient, and it shows some interesting fluctuations. It will be recalled that the point of beginning hemolysis indicates the destruction of the least resistant or most fragile cells, and the point of complete hemolysis indicates the destruction of the most resistant ones. Before splenectomy the fragility was increased at both points. Following operation there was some increase in the resistance—a change toward the normal. But this change was slight with respect to the point of beginning hemolysis, indicating that cells previously damaged, presumably by the abnormal spleen, remained definitely impaired. The point of complete hemolysis, however, returned to normal within two weeks, indicating that the youngest circulating red cells, arriving in the blood-stream after the spleen was removed, were

of normal resistance. But after a lapse of two months from the time of operation the point of complete hemolysis rather suddenly returned to its previous high level, indicating again increased fragility of all the circulating cells. It seems reasonable to suppose that some other tissue took over the function of the abnormal spleen, just as the retroperitoneal hemolymph-nodes carry on some of the functions of a normal spleen under similar conditions. In any event, it is plain that certain aspects of the original disease process remain, and cannot be due entirely to the spleen alone.

Finally, observations on the basal metabolic rate in this case seem to indicate that the pathology is largely but not entirely confined to the spleen. Shortly after entrance the basal metabolism was 29 per cent. above normal. Eight weeks after operation, when the patient was clincially well, it was 17 per cent. above normal. Although I know of no other observations of this sort, it is to be expected that this disease would be characterized by an increased rate with the blood-pigment metabolism so tremendously increased. The failure of the rate to fall to normal with clinical cure is additional evidence, I think, of pathology which is extrasplenic.

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THREE TYPES OF PERICARDITIS; WITH REMARKS UPON RHEUMATIC FEVER AND UPON CARDIAC DIAGNOSIS

POSTMORTEM statistics indicate that few disease processes are so frequently overlooked by the clinician as those which affect the pericardium. The polygraph, the electrocardiograph, the Roentgen ray, and many studies of the normal and abnormal physiology of the heart have altered profoundly our conceptions of cardiac disease, and have greatly increased our facilities for recognizing the various types. Pericardiology has enjoyed no similar renaissance; in fact, one of the chief objects of many of the more recent articles dealing with the subject has been to point out our lack of knowledge of pericardial disease and our frequent inability to recognize it. It seemed to us, therefore, that the following case histories, illustrating three common types of pericarditis, might be of interest.

RHEUMATIC PERICARDITIS

Miss L. J., an American schoolgirl, aged fifteen, was admitted to the University Hospital April 24, 1922, complaining of painful, swollen joints.

Family History.—The father had had heart trouble for a number of years previous to his death from typhoid fever three years before. The mother had severe headaches and swelling of the ankles. One brother, aged twenty, was incapacitated by heart disease. One sister, aged twenty-five, had kidney trouble.

Past History.—The patient had had measles, mumps, and whooping-cough during childhood and typhoid fever without

complications at thirteen. She had had many attacks of tonsillitis, and one year before influenza with considerable pleural pain. There had been nocturia two or three times nightly for a number of years, and she thought that it was due to habit. Within the past two years she had had two epileptiform attacks.

Present Illness.—In February, 1920 the left ankle suddenly became swollen and painful; it was not reddened. She thought at first that this was the result of a sprain, but twenty-four hours later the other ankle was similarly affected. A month later, when the swelling of the ankles had nearly subsided, the knees became involved. Then the process spread to the hands, wrists, elbows, and shoulders. About two weeks before admission she began to have precordial pain and shortness of breath, and the ankles became more swollen, so that they pitted on pressure. She had taken no medicine except "nervine," which was taken to prevent epileptic attacks.

Examination.—The tonsils were moderately enlarged and "septic" and the posterior cervical glands were palpable. The thyroid was slightly enlarged.

The apex-beat was felt in the fifth interspace just inside the anterior axillary line. There was visible pulsation in the second and third interspaces just to the left of the sternal margin. A thrill, questionably presystolic, was felt at the apex. The heart rate was 120 per minute. There was a blowing systolic murmur at the apex and also a diastolic murmur with a presystolic accentuation. A blowing diastolic murmur was heard along the left border of the sternum, but not in the aortic area. The right border of the cardiac dulness was 4 cm. from the midsternal line in the fifth interspace. Orthodiagraphic examination showed considerable cardiac enlargement with a prominent left auricular salient; the right and left borders of the cardiac silhouette measured 45 and 66 mm. respectively from the midline. The arteries of the neck showed exaggerated pulsation. The systolic blood-pressure was 125 mm. Hg., the diastolic, 75 mm. Hg.

The lungs and the abdomen were negative. The skin of the extremities was dry and scaly. The ankles, knees, elbows, and the metacarpophalangeal joints of the first and second fingers of

both hands were swollen and there was marked limitation of motion due to pain. There was no ankylosis and no crepitation on movement and there was no conspicuous muscular atrophy. The temperature was 102° F. The urine was negative. The blood examination showed 75 per cent. hemoglobin, 4,000,000 red blood-cells and 9900 white blood-cells per cubic millimeter.

Course.—The patient was given 20 grains of sodium salicylate every three hours, but after twenty-four hours she was nauseated, and the dosage was decreased to 60 grains per day. She received salicylates in the form of sodium salicylate or aspirin except for brief periods throughout her stay in the hospital.

On May 7th the patient complained of sharp, stabbing pain in the precordium when lying on the left side and of pain in the region of the xyphoid cartilage with radiation to both shoulders. On examination a typical to-and-fro pericardial friction-rub was heard over the central precordium. It persisted until May 12th. An orthodiagraphic examination on May 10th showed that the cardiac shadow was considerably larger than on admission. The right and left borders measured 73 and 81 mm. respectively from the midline. There was a suspicion of a small pericardial effusion at this time. The patient continued to have an irregular fever in spite of salicylate therapy, and on May 20th the tonsils were removed.

Following the tonsillectomy there was rapid improvement for a time. The temperature gradually returned to normal and there was a considerable gain in weight, with marked relief from symptoms. It was difficult to keep the patient constantly in bed, and for a time she felt well enough to be up and about the ward. The pulse-rate remained at 120 until July 27th, when it fell to 90, and remained there for a period of ten days. From time to time the patient complained of joint pains; the examination of the heart showed no change.

On September 17th the temperature rose again to 102° F., and the patient complained of backache, headache, and pain over the heart. There had been a chronic infection of the accessory sinuses since admission, and at this time a submucous

resection of the nasal septum was done. Following this operation the temperature again returned to normal and there was another period of transient improvement; the pulse-rate remained at 120.

About October 6th the patient began to complain of pain in the epigastrium and the urine showed changes for the first time. Catheterization was necessary and the urine was small in amount and contained albumin and red blood-cells. From this time the condition grew gradually worse. There was irregular fever and joint pains, and edema which increased in spite of the treatment used to combat it until, in November, there was general anasarca, with conspicuous edema of the face. A purpuric rash appeared at this time. The patient died on November 22d.

From the time of the friction-rub there was little change in the cardiac signs; we felt certain that the pericardium had become adherent, but none of the text-book signs of this condition were present except that there was an unusual amount of wave-like pulsation over the precordium. An orthodiagraphic examination on August 2d showed the cardiac shadow to be but little larger than on admission; the right and left borders were 48 and 80 mm. respectively from the midline. The last Roentgen-ray examination was made on October 4th; the measurements were 67 and 88 mm.

The autopsy showed general anasarca, hydrothorax, and ascites. There was a well-marked nutmeg liver and chronic passive congestion of all organs, more conspicuous in the lungs, spleen, and kidneys. There was a healed infarct in the left kidney. There was an acute purulent pancreatitis which was regarded as the result of a terminal infection. The pericardium was universally adherent. The heart muscle showed a typical rheumatic myocarditis; there was localized fibrosis about the blood-vessels and areas of round-cell infiltration, fatty degeneration and infiltration, and Aschoff nodules. There was a subacute endocarditis involving and deforming the aortic and mitral valve leaflets with resulting aortic and mitral insufficiency. There was no mitral stenosis.

The occurrence of heart disease in a brother, aged twenty, is the only significant feature of the family history. Heart disease at this age is almost always the result of rheumatic infection. The occurrence of rheumatic fever in more than one member of a family is too common to be due to accident. Some observers have noted that certain dwellings appeared to be sources of the disease. Such observations throw little light upon the nature of the disease, since it is impossible to tell whether contagion or environmental factors are responsible.

Many rheumatic individuals give a history of tonsillitis and occasionally an attack of sore throat immediately precedes the joint symptoms. Other patients give no history of throat trouble, and there seems no reason to regard the tonsils as the invariable portal of entry of the disease. Nevertheless, as is indicated by the work of St. Lawrence, the removal of foci of infection in the throat and mouth may prove a very valuable measure in the prevention of recurrent rheumatic attacks. Whether the removal of the tonsils in early childhood, which is now so common a practice, will reduce the incidence of rheumatic fever, and hence of heart disease in the young, the future must decide; it is a matter which deserves our earnest attention.

In many individuals rheumatic fever appears to be a self-limited disease, but unlike most diseases of this type it shows a decided tendency to recur. Often a history of from two to a half-dozen attacks separated by intervals of months or years is obtained, and many rheumatic children are subject also to chorea which appears to be another manifestation of rheumatic infection. The case under discussion is a good example of the subacute form of the disease in which the symptoms are relatively mild and the intervals separating recurrences (or rather relapses) are so short that the illness is practically continuous. Many patients with rheumatic heart disease are subject throughout life to vague pains in the joints or even to typical attacks of acute arthritis. Not long ago we saw a patient with mitral stenosis, which, judging by the history, was of about twenty years' duration, who developed while in the hospital an acute arthritis of the wrist having all the characteristics of the ar-

thritis of rheumatic fever. The recurrent attacks of rheumatic fever have usually been considered reinfections, but the idea is gaining ground that rheumatic fever must be added to the list of infections that remain latent for long periods and become active again and again when suitable conditions arise. The time may yet come when we shall treat the rheumatic as we now treat the syphilitic and the tuberculous for months or years. The tendency of rheumatic heart disease to progress suggests that foci of infection may persist in the cardiac muscle.

There is but one sign of fibrinous pericarditis, the characteristic friction-rub. It is usually so distinctive in equality that it is rarely confused with other sounds arising in or near the heart; a soft to-and-fro rub which seems to be just under the stethoscope, is usually heard best over the central precordium, and it is not, as are pleuropericardial frictions, much affected by respiration. It is often stated that it may be made louder by pressure, but we have never been able to demonstrate this to our own satisfaction. It often persists but a few days or even hours; hence the importance of listening for the friction frequently in those diseases in which pericarditis is a common complication. Had the friction escaped notice for the five days of its presence in the case under discussion, the possibility of recognizing the pericarditis and the synechia of the pericardial surfaces which resulted would have passed for all time. It will be noted that the orthodiagraphic shadow of the heart was larger at the time when the friction was heard than it was three months later. Transient enlargement of the heart shadow is not uncommon in rheumatic carditis; when attributing it to cardiac dilatation the possibility of a small pericardial effusion should be borne in mind.

If fibrinous pericarditis is poverty stricken with respect to its sign it is even more so as regards its symptoms. Dyspnea and precordial pain are the only common ones which accompany it, and these are present in less than one-half the cases. Even when they are present one is often in doubt as to whether they should be attributed to the pericarditis or to the myocardial changes that are usually coincident. This difficulty is a prom-

inent one in the present case, for in spite of the fact that severe precordial pain immediately preceded the discovery of the friction-rub, the history indicates that similar pain was present at a time when we must presume that the pericardium was still uninvolved. Occasionally pericarditis is associated with pain, not in the precordium, but in the abdomen, and Fussel and Kay have reported several cases in which abdominal pain simulating that of appendicitis was present. Whether the abdominal pain in such instances arises through involvement of that part of the precordium which lies upon the diaphragm or whether it is due to congestion of the liver or some other cause has not been determined.

This case illustrates a frequent outcome of fibrinous pericarditis, namely, adherent pericardium. Whether pericardial adhesions are the invariable result of pericarditis is a question which we do not feel prepared to answer. It is possible that a very mild inflammation may clear up without adhesions. Even when the two layers of the pericardium become universally adherent, however, the heart may be not at all embarrassed thereby and the condition is often discovered postmortem in patients who have never had cardiac symptoms. Adherent pericardium following rheumatic fever is, for obvious reasons, usually complicated by valvular and myocardial lesions so that its effect upon the heart cannot be readily estimated. In most cases it produces no characteristic signs. In the present case the unusually wide-spread, wave-like pulsation was the only sign that could be considered suggestive of it (see Allbutt, Oxford Loose-leaf Medicine). On the other hand, all of the so-called signs of adherent pericardium may be present, when the heart is greatly enlarged, in cases which show no pericardial adhesions postmortem (Levine). It would seem likely that the text-book signs of adherent pericardium which depend upon extrapericardial adhesions would be more common in those cases in which adherent pericardium is a sequel of tuberculous pericarditis than in those in which it follows rheumatic fever, but the data necessary to the determination of this point are not at hand.

Pericardial effusion is common in rheumatic pericarditis, but the amount of fluid which collects is usually small and ab-

sorption takes place readily, so that paracentesis of the pericardium is almost never required as a therapeutic measure.

This case furnishes an excellent demonstration of the fact that rheumatic fever gives rise to *pancarditis*. Neither pericarditis nor endocarditis occurs alone; there is always an associated myocarditis. It is invariably found in the fatal cases, and indications of its existence are often present during life. Graphic methods frequently reveal prolongation of the As-Vs interval or other disturbances of the cardiac mechanism which are dependent upon myocardial lesions. Furthermore, it is probable that some of the signs that are often regarded as the results of endocarditis are really of myocardial origin. The endocardial lesion in its acute stages consists in small verrucose vegetations along the line of closure of the valve leaflets. As Holst has pointed out, these can hardly disturb the efficiency of the valves to any great extent; the valve defects with which we are so familiar are produced by the reparative processes set up by the valve injury, and hence develop slowly. The acute valvulitis produces no symptoms, and so far as its immediate effects are concerned is of no consequence. The enlargement of the heart and the cardiac weakness which accompany the acute stages of rheumatic carditis are not the result of the endo- or pericardial lesions, but must be attributed to the myocardial injury. Even the mitral systolic murmur which so frequently occurs is more probably due to cardiac dilatation with resulting relative mitral insufficiency than to deformity of the valve curtains. It seems, therefore, that so far as the acute cardiac complications of rheumatic infection are concerned, the myocardial lesions are the most frequent and most serious, and are chiefly responsible for the symptoms.

The relative importance of the remote effects of endo-, peri-, and myocarditis is more difficult to estimate. The valve lesions which result from the first undoubtedly increase the work of the heart, and mitral stenosis may so reduce the size of the mitral orifice as to seriously interfere with the mechanics of the circulation. Synechia of the pericardial layers may also add to the heart's burden or, if present in childhood, perhaps interfere

with its growth. But it is difficult to believe that the increased work that the heart must do because of these lesions is more than a contributory cause of ultimate cardiac failure. The opinion seems to be gaining ground that the myocardial lesions of rheumatic fever also have remote effects, and that these are of equal or of even greater importance than the valvular lesions. This opinion is based upon the differences between the valve lesions that occur in man; upon a failure to find a close relation between the magnitude of the valve lesion, the degree of cardiac hypertrophy and enlargement, and the functional efficiency of the heart; and upon the tendency of cardiac failure to follow the onset of auricular fibrillation or to follow infections. In attempting to give the myocardial lesions their just importance we should not, however, make the mistake of disregarding the mechanical effects of the valve lesions entirely.

The typical lesion of rheumatic myocarditis is the Aschoff nodule, a small peculiar aggregation of connective-tissue cells. No exactly similar reaction is found in other types of myocarditis, and this is one of the chief reasons for regarding rheumatic fever as a specific infectious disease rather than as a syndrome due to a variety of organisms. But if this view is correct the causative organism is unknown or, if known, its causal relation to the disease is unproved. Streptococci of various sorts have been isolated from the joint fluid, the blood, and the endocardial vegetations, but it has never been shown beyond reasonable doubt that they are more than secondary invaders.

The intern who first examined the patient failed to recognize the aortic lesion because he did not hear the diastolic murmur at the second right costal cartilage. In the presence of the vascular signs of aortic insufficiency such a mistake would be unpardonable. But even in their absence there is seldom any excuse for confusing the diastolic murmur of mitral stenosis with that of aortic regurgitation; the two murmurs are absolutely different in quality, in distribution, and, usually, in time. The former is low pitched and rumbling, is usually confined to a small region in the vicinity of the apex, and is usually separated from the second sound by a brief interval; the latter is high pitched and

blowing, is loudest along the left border of the sternum or in the aortic area, and immediately follows or even partially replaces the second sound. In the present case no mitral stenosis was present and the mitral diastolic murmur must be considered an Austin Flint murmur.

TUBERCULOUS PERICARDITIS WITH EFFUSION

Mr. A. D., an English laborer, aged forty-five, was admitted November 26, 1920, complaining of shortness of breath, swelling of the ankles, and general weakness.

He had had the usual diseases of childhood, but there was no history of scarlet fever, typhoid fever, influenza, rheumatic fever, diphtheria, tonsillitis, or venereal disease.

About three weeks before admission he caught "cold"; the chief symptom was a severe productive cough. He consulted his physician, who told him that his heart was affected. He then noticed for the first time that exertion or excitement produced palpitation and breathlessness. His ankles first became swollen on the day preceding admission. He had had occasional pains in the chest, but there was no history of night-sweats or hemoptysis. He was 20 pounds underweight and had lost 10 pounds in the preceding three weeks. He did not mention at this time the disease of the hip which was discovered on examination, and no details regarding it were obtained.

The patient was well nourished. The tonsils were enlarged and "septic" and the cervical glands were palpable. Tactile fremitus was absent over the lower third of the left chest, both anteriorly and posteriorly. This region was dull to flat on percussion and the breath sounds were absent. The voice sounds were distant and bronchial in character. A few crackling râles were heard at the upper margin of the dull area.

The cardiac impulse was felt in the fifth intercostal space just outside the nipple line. The cardiac dulness did not extend beyond the sternum on the right; on the left it was continuous with the dull area previously described. On auscultation a to-and-fro friction-rub was heard over the precordium; it was loudest in the neighborhood of the apex and was accompanied

by a definite thrill. At the base of the heart the sounds were poorly heard; there were no endocardial murmurs; the cardiac rhythm was absolutely irregular. A Roentgen-ray examination made at this time showed an enormous cardiac shadow extending 82 mm. to the right and 132 mm. to the left of the midline (Fig. 169). The heart shadow obscured the left costopleural angle

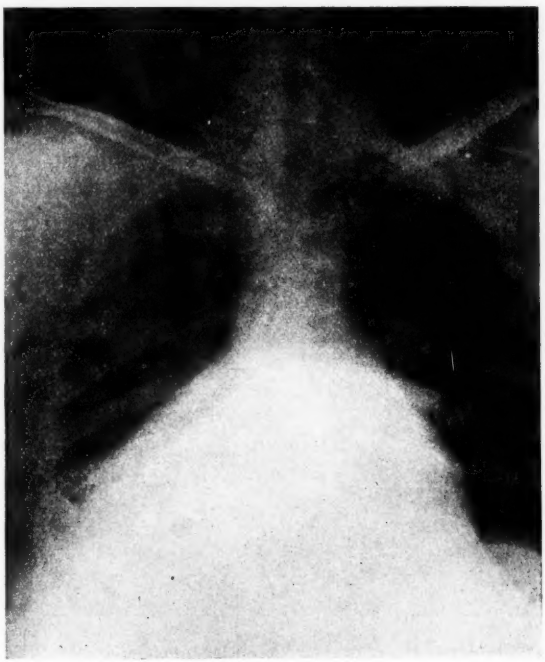

Fig. 169.—Case II. Roentgenogram taken on admission to the medical ward. Large pericardial effusion. Note the acute cardiohepatic angle.

so that the presence or absence of pleural fluid could not be determined. The peripheral vessels were sclerotic. The systolic blood-pressure was 125 mm. Hg., the diastolic, 75 mm. Hg.

The abdomen was negative except for slight distention. None of the abdominal organs could be felt.

There was marked edema of the ankles. The right leg was

found to be about 4 inches shorter than the left and the right hip-joint was partially ankylosed. About the joint were several scars indicating the previous presence of discharging sinuses.

The urine showed a trace of albumin. There was a well-

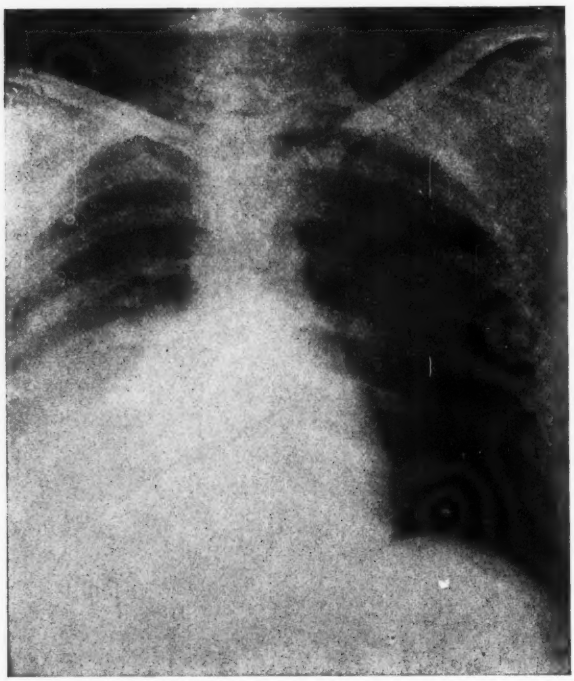

Fig. 170.—Case II. Roentgenogram taken on December 7th about eight days after diagnostic puncture of the pericardium. A large amount of fluid has leaked from the pericardial sac into the left pleural cavity by way of the puncture wound.

marked secondary anemia: Hb. 65 per cent., red blood-cells 3,840,000, white blood-cells 9700.

Course.—The patient had an irregular fever with a temperature ranging from normal to 102° F.

On November 29th a pleural paracentesis was done, but only a few drops of fluid were obtained. A pericardial puncture was

then made in the anterior axilla well outside the apex-beat and 30 c.c. of a serosanguineous fluid were withdrawn. The specific gravity of this fluid was 1023 and it contained 48 grams of albumin to the liter. There were 900 nucleated cells per cubic millimeter, of which 65 per cent. were small and 21 per cent. large mononuclears, 2 per cent. polymorphonuclears, and 10 per cent.

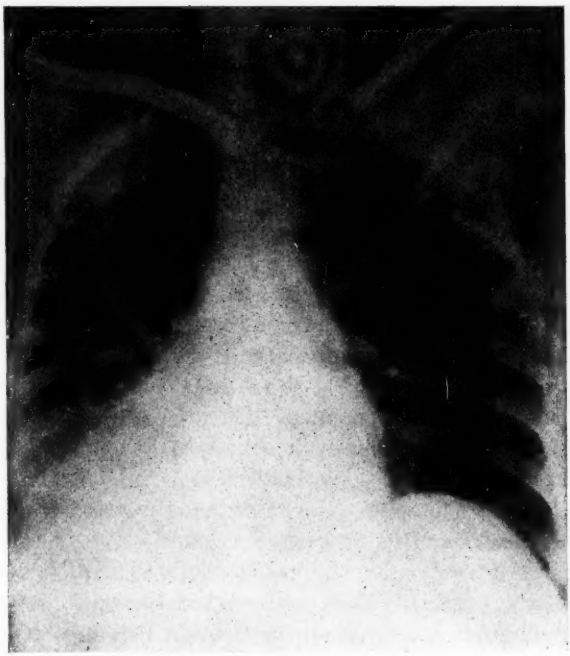

Fig. 171.—Case II. Roentgenogram taken after the withdrawal of 1680 c.c. of pleural fluid.

endothelial cells. A small portion of the fluid was injected into the peritoneal cavity of a guinea-pig, which died about February 10th of tuberculosis.

On December 7th it was noted that there was a great increase in the extent of the dull area in the back, and there was a small area in the interscapular region over which bronchial

breathing could be heard. The cardiac rhythm was then regular, the temperature was nearly normal, and the patient was symptomatically much improved. The friction sound was still present. On the following day a second Roentgen-ray examination was made; it disclosed a rather remarkable state of affairs. The cardiac shadow was much smaller than before, but a large pleural effusion was present on the left side (Fig. 170). It was quite evident that a considerable quantity of the pericardial fluid had drained into the pleural cavity through the puncture wound. A pleural paracentesis was immediately done and 1680 c.c. of fluid were withdrawn. A roentgenogram taken immediately afterward showed that practically all of the pleural fluid had been evacuated (Fig. 171). Many loud friction sounds could be heard over the chest after the removal of the fluid.

The pericardial friction disappeared about December 25th; at this time the cardiac shadow was still smaller and there was a moderate amount of fluid in the left pleural cavity. The patient was afebrile and symptomatically much improved. From this time until his discharge (February 16, 1921) there was a gradual decrease in the size of the cardiac shadow and in the amount of pleural effusion. Slight retraction of the left side was present when he left the hospital.

The patient returned November 14, 1921, about one year after his first admission. He was entered in the Department of Orthopedic Surgery because of tuberculosis of the ankles. When seen by the authors he was obviously dying from cardiac failure and toxemia. There was marked edema of the lungs and respiration was so violent and noisy that a satisfactory examination of the heart could not be made.

The autopsy disclosed a chronic, adhesive, tuberculous pericarditis, nearly healed, but with a few active areas. There was a diffuse tuberculous mediastinitis with secondary pyogenic infection and periesophageal phlegmon. The myocardium showed marked fatty infiltration and atrophy. There were a number of polypoid parietal thrombi in the left ventricle and many embolic infarctions of the spleen, kidneys, skin, brain, and hypophysis. There were multiple hemorrhagic infarctions

of the lungs, which showed, in addition, great edema, passive congestion, atelectasis, and scattered miliary tubercles. There was an extreme nutmeg liver. The right hip showed old tuberculosis with ankylosis and there was a more recent tuberculosis of the ankle. All of the parenchymal organs showed passive congestion and atrophy.

Tuberculosis of the pericardium is a relatively uncommon disease. It may be associated with advanced tuberculosis of the lungs, in which case it is usually latent, but it seems to be more commonly a part of a general serositis or secondary to a tuberculous focus elsewhere in the body, particularly in the mediastinal glands. The onset is most often insidious, as is so frequently the case in tuberculous pleurisy. The patient begins to feel weak, coughs, is short of breath, and perhaps has slight fever, but he does not seem so very ill, and the physician is greatly surprised to find an enormous pericardial effusion. Tuberculosis is probably the most common cause of very large effusions amounting to 2 or more liters; certainly it produces in proportion to its incidence more large effusions than the other types of pericardial inflammation. The fluid may be serofibrinous, but is frequently hemorrhagic, as in this instance, and bloody fluid should always lead to the suspicion that the cause is tuberculosis. Rarely the effusion is purulent.

The diagnosis of pericardial effusion is often easy, but it may be very difficult. Not infrequently a friction-rub persists even when 2 or more liters of fluid are present. This was the case in three of the four very large effusions which have come to our notice during the past two years. It is most likely to persist at the base just to the left of the sternum, but it sometimes persists at the apex, as in the case under discussion. It is quite evident that in many cases the heart is not freely movable inside the distended pericardial sac, but remains in contact with the anterior chest wall. Another sign of great importance when present is faintness of the heart sounds; this was a conspicuous feature of one of our recent cases. In this instance a friction-rub persisted at the base, but the heart sounds were practically inaudible and the shock which the heart-beat im-

parts to the precordium was also greatly diminished. In many cases, however, no significant change in the heart sounds is observed. A third sign which is often of value in reaching a diagnosis is Ewart's sign or the presence of signs similar to those of consolidation in the left back; most often near the angle of the left scapula or in the lower left interscapular region. These signs are presumably due to compression of the lung by the fluid which collects behind the heart. In one of our recent cases these signs were so conspicuous that the diagnosis of pneumonia was made by the intern, and it was not until the Roentgen-ray examination showed an enormous heart shadow that the true state of affairs was appreciated. In the present case bronchial breath sounds were not heard in the back except during the period when there was a large pleural effusion.

Percussion often furnishes data important to the diagnosis of pericardial effusion. The superficial cardiac dulness is greatly increased in extent and the relative dulness extends far to the right of the midline and beyond the apex-beat on the left. A wide extension of the cardiac dulness to the right may, of course, occur as a result of engorgement of the right auricle, but it is then accompanied by very prominent signs of heart failure, whereas even with large pericardial effusions these signs may be relatively inconspicuous. It should be noted that the intern found the right border of cardiac dulness at the sternal margin in the case under discussion in spite of the fact that the roentgenogram showed the heart shadow to extend 8 cm. to the right of the midline. This is a common error in percussion; the beautiful diagrams which are so often drawn upon the patient's chest frequently represent what the examiner thinks the cardiac dulness ought to be like rather than objective phenomena. The particular mistake made in this case undoubtedly arose through failure of the examiner to begin his percussion far enough to the right; he thus began his percussion inside the border of the cardiac dulness.

Extension of the cardiac dulness beyond the apex-beat so commonly results from left pleural effusion or hydrothorax that it is of no value in the diagnosis of pericardial effusion when

there is dulness in the lower left back. In the present case no significance could be attached to this sign because of the dulness in the left back, although this proved to be due to the size of the pericardial effusion rather than to a coexistent pleural effusion.

Since the introduction of the Roentgen ray it has been shown that the cardiohepatic angle is almost invariably acute. The idea that this angle was obtuse in pericardial effusion which was formerly widely held is just another indication of the subjective factor in percussion of the cardiac outline. In the diagnosis of pericardial effusion the Roentgen-ray examination is of great value. The heart shadow has a characteristic leather-bottle shape, and the pulsations are very much diminished or absent. There is often a change in the shape of the cardiac shadow with change of posture. Great dilatation of the heart, which may give a very similar picture, is often excluded by the general condition of the patient.

The remaining signs of pericardial effusion given in the text-books are of little importance. We have seen the pulsus paradoxus in this condition, but it is more frequently absent than present, and it may be present in the absence of effusion. Williamson lays considerable stress upon depression of the left lobe of the liver, and this sign is also mentioned by Osler. The former found that it occurred uniformly when fluid was injected into the pericardial sac of the cadaver. We doubt whether the results of such experiments can be unreservedly applied to clinical pericardial effusion where the fluid collects slowly, where the heart is in constant motion, and where the pericardial sac is much changed, and probably not uniformly changed by the disease process. Depression of the left lobe of the liver has not been a conspicuous feature of the cases of pericardial effusion that we have seen. Engorgement of the liver is a feature of many cases and may be due to cardiac weakness or to pressure upon the vena cava within the pericardial sac.

The occurrence of leakage from the pericardial to the pleural cavity in this instance raises the question of where the needle should be inserted in puncturing the pericardium. With the idea of avoiding this contingency it was formerly a common

practice to puncture in the costoxiphoid angle or in one of the lower interspaces either to the left or to the right of the sternum. Puncture of the heart sometimes resulted, but only rarely did this result in intrapericardial hemorrhage. Most authors now advise that the puncture be made just inside the left border of dulness, although in one or two instances the puncture has been made in the back when other routes failed to reach the fluid which the examiner felt certain was present. That the needle passes through the pleural space when this route is chosen is regarded as of little consequence; in many instances a left pleural effusion coexists. When the pleura is not involved it would seem that there is little to choose between the danger of infecting the pleura and the danger of puncturing the heart; neither of these accidents is likely to prove serious. That infection of the pleura occurred in our case seems likely since many pleural friction sounds were heard following the removal of the pleural fluid, but this probably had no influence upon the ultimate outcome; at autopsy pleural adhesions were found on both sides.

Tuberculous effusions absorb slowly and are prone to be followed by great thickening of the pericardial layers and by chronic mediastinitis. Complete recovery is possible, and calcification of the pericardium which is sometimes discovered at autopsy or by Roentgen-ray examination is probably one of the end-results of pericardial tuberculosis. A very interesting roentgenogram of this condition was recently shown one of the authors by Drs. Oppenheimer and Rothschild, of Mount Sinai Hospital, New York City. The heart was practically enclosed in a calcified envelope. It is probable also that the syndrome known as Pick's disease is sometimes the final outcome of tuberculosis involving the pericardium and peritoneum.

Paracentesis of the pericardium often seems to hasten the absorption of the exudate, but it is not urgently indicated as a therapeutic measure except in those instances in which the cardiorespiratory mechanism is embarrassed by the size of the effusion or by the pressure which it exerts. Wencheback has reported good results from the injection of air following the removal of the fluid. It is possible that this procedure might have

a favorable influence upon the healing of a tuberculous pericarditis, just as laparotomy appears to promote healing of peritoneal tuberculosis.

UREMIC PERICARDITIS

Mr. J. E., an American clerk, aged thirty-two, was admitted February 15, 1922, complaining of failing vision.

The patient had had scarlet fever when eight years old and gonorrhea followed by a prostatic abscess one year before admission. He had had sore throat nearly every winter, but no frank tonsillitis.

About four weeks before admission he began to notice a slight blurring of vision which had rapidly become worse. He had had severe headaches for two years, but these ceased following the extraction of two teeth two weeks before. On one occasion there had been slight swelling of the ankles after he had been on his feet all day, and for the past few months he had noticed increased dyspnea on exertion.

The tonsils were enlarged and injected. The cardiac apex was felt in the fifth interspace, 11½ cm. from the midline. On auscultation there was slight accentuation of the aortic second sound. The systolic blood-pressure was 190 mm. Hg., and the diastolic, 110 mm. Hg. The urine contained about 2 gm. of albumin per liter and there were many casts and a few red blood-cells in the sediment. The blood contained 24 mg. of non-protein nitrogen per 100 c.c. The phenolsulphonephthalein test showed an excretion of 15 per cent. the first, and 20 per cent. the second, hour.

Opthalmoscopic examination showed a marked albuminuric retinitis and edema of the nerve head. An orthodiagraphic examination showed moderate cardiac enlargement; the right and left borders of the cardiac silhouette measured 39 and 90 mm. respectively from the midline.

The tonsils were removed and all foci of infection in the mouth were eradicated, and the patient returned home with instructions to drink large amounts of water and to take a low-protein salt-poor diet.

He returned to the hospital June 23, 1922. He stated that for five weeks after leaving the hospital he had felt quite well and had worked without intermission. He had followed the diet religiously and had drunk not less than 3 quarts of water per day. He had then begun to have smothering attacks which made him very nervous so that he could not sleep. He had vomited frequently, and had had ringing in the ears, cough, and pain in the epigastrium.

On examination he appeared somewhat drowsy, and there were twitching movements of the extremities. There was a marked secondary anemia, Hb. 44 per cent., red blood-cells

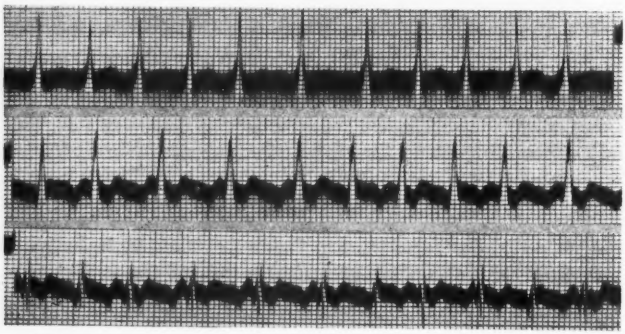

Fig. 172.—Case III. Electrocardiogram taken during an attack of tachycardia. It shows auricular flutter with irregular ventricular response.

2,830,000, white blood-cells 13,600. The urine contained a large amount of albumin and many granular casts. The blood contained 189 mg. of non-protein nitrogen per 100 c.c., and the phenolphthalein excretion was too small to be measurable. Orthodiagraphic examination showed that there had been an increase in the size of the heart; the measurements were now 49 and 98 mm. The systolic blood-pressure was 185 mm. Hg. and the diastolic, 140 mm. Hg.

The patient's condition grew gradually worse. He was constantly nauseated and vomited several times each day. There was marked twitching of the extremities and he complained of smothering sensations at night. The blood-pressure rose; the

non-protein nitrogen of the blood fell temporarily, but soon reached its previous level.

The patient complained of occasional precordial pain, but it was not severe until August 8th, when he had a very severe attack of pain in the precordium and back for which he required morphin. Examination was negative at the time, but about two hours later a definite to-and-fro friction-rub was heard. This persisted until he left the hospital November 6th. From time to time there was a sudden increase in the heart rate which electrocardiographic examination proved to be due to attacks of auricular flutter (Fig. 172). On November 4th

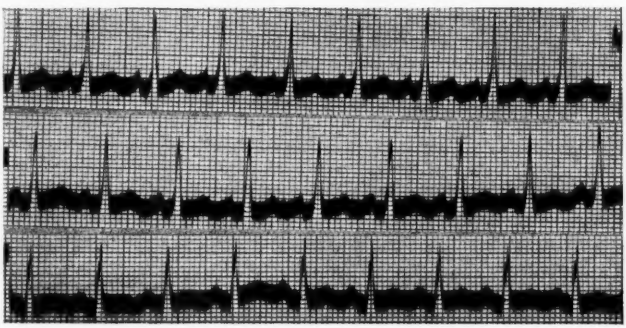

Fig. 173.—Case III. Electrocardiogram taken after the attack of auricular flutter shown in Fig. 172. The cardiac mechanism is now normal.

he had a severe epistaxis. He grew rapidly worse and, realizing that his condition was hopeless, wished to return home. He died about November 9th.

Pericarditis has long been described as a not infrequent complication of chronic debilitating diseases, such as diabetes, gout, and nephritis. The pericarditis of nephritis has emerged from this group as a special form. It is sometimes due to the invasion of streptococci or other organisms which is so frequent in the later stages of chronic illnesses, but in a large number of cases it appears to be the direct result of the nephritic toxemia. This view has recently been championed by Barach, who found that the exudate was often sterile. He points out that peri-

carditis usually occurs in cases of chronic nephritis in which there is a considerable retention of nitrogenous waste products in the blood, a notable acidosis, and a hemorrhagic tendency. The case under discussion is a notable example of this group; unfortunately, no tests for acidosis were made.

"Pericarditis brightique," as the French have long termed this complication of nephritis, is a harbinger of death, for although it is not in itself fatal, it is associated with a degree of kidney damage that is not for long compatible with life. Of 29 cases studied by Levine, 28 died while under observation, and one left the hospital in a very grave condition. Three of the 30 cases studied by Barach lived from two to four months, and one lived a year. In this case the autopsy disclosed an adherent pericardium.

According to Barach the amount of effusion is usually small; in only 3 of his 30 cases did it exceed 200 c.c. When the pericarditis is the result of infection, polymorphonuclear cells preponderate in the fluid. In one of Barach's cases the fluid was bloody.

Levine, who has been particularly interested in the cardiac rhythm in this condition, found that it was rarely disturbed. It is interesting to note that in one of the cases studied by him paroxysmal attacks of auricular fibrillation and of flutter similar to those seen in our case occurred.

In most cases of uremic pericarditis there is no pain and the patient is quite unaware of the onset of the condition. In the case described the pain was very severe, and although there had been some precordial pain preceding the onset of the pericarditis, it seems likely that the pain was of pericardial origin. It did not seem to be due, however, to the rubbing together of the roughened pericardial surfaces, for the friction persisted for many days after the patient had ceased to complain of the pain.

CLINIC OF DR. PHIL L. MARSH

UNIVERSITY HOSPITAL, ANN ARBOR

CHRONIC PANCREATITIS

BECAUSE of the dual function of the pancreas—in the digestion and in the intermediary metabolism—disease of that organ is of unusual clinical interest. The pancreatic ferments are important in the digestion of all three food-stuffs, but most especially of fat. Its internal secretion, elaborated by the islands of Langerhans, is essential to the utilization of glucose, which is, for practical purposes, the only form in which carbohydrate is available to the body. Pancreatic insufficiency, then, may manifest itself (1) by inability to utilize glucose, (2) digestive disturbances, or (3) rarely, a combination of both. Three cases are presented as examples of each of these clinical entities. The diagnosis was clear in each, and was confirmed in one by operation, in the second by the response to specific therapy, and in the third by autopsy.

Case I.—Mrs. J. S., a housewife, born in England, sixty-five years of age, entered the hospital January 10, 1922, complaining of pain in the back and headache. Her family and past histories were without interest. In 1914 diabetes mellitus developed insidiously, with progressive weakness and loss of weight. A physician found sugar in her urine, and starch and sugar were omitted from her diet. Her urine was sugar free for a short period, but there had been glycosuria during most of the intervening time. Her menopause occurred at forty-five, without unusual symptoms. There had been some failure of vision not entirely corrected by glasses. For several years she had been disturbed by a "prickling" sensation over her hands and feet. Thirst and polyuria had been present since the onset of her

symptoms, and her urine amounted to about 5 quarts a day. Her best weight, just before the onset, was 196 pounds; at admission she weighed 134 pounds. Her blood-sugar was 0.24 per cent. and her first twenty-four-hour urinary specimen contained 25 gm. glucose.

In 1919, three years before admission to the hospital and five years after the appearance of diabetic symptoms, she had an attack of severe pain in the upper right quadrant of her abdomen, radiating to the back and right shoulder, relieved only by morphin, associated with jaundice, and lasting for several days. There had been three other similar attacks in the interval before she came to the hospital, and during at least one of these she was known to have had a fever. On her fifteenth day in the hospital she complained of pain in the epigastrium, loss of appetite, and nausea; her temperature was slightly elevated, and there was moderate tenderness in the upper right abdomen. Routine stool examination revealed no abnormality. There was no difficulty in reaching a diagnosis of chronic cholecystitis with cholelithiasis, and it seemed probable that the diabetes was the result of chronic pancreatitis from extension of the inflammation of the biliary tract. In view of the severity of her symptoms and in the hope of preventing further damage to her pancreas, she was transferred to the Department of Surgery for operation. Her urine at this time was sugar and acetone free on a diet which allowed her protein 55 gm., fat 220 gm., carbohydrate 35 gm., and 2340 calories. The following is quoted from the operative report: "Exploration revealed a liver that was smaller than normal. Its surface was of a pearly white color, and it was very firm and irregular, characteristic of a hobnail liver. The head of the pancreas was larger than normal and uniformly hard, but not nodular to palpation. The gallbladder was smaller than normal, and contained a number of stones; its walls were thickened. . . . One large stone about the size of a hazelnut and several smaller stones were removed." A cholecystectomy was performed. Her convalescence was uneventful and on October 1, 1922 she is sugar free and feeling very well on the diet mentioned above.

Comment.—Since the classical studies of von Mehring and Minkowski on depancreatized dogs the pancreas has attracted increasing attention in its relation to glycosuria, and especially in relation to diabetes mellitus. Weichselbaum, Opie, and others stimulated investigation into the pathology of the pancreas in human diabetes mellitus. Recently Allen has accumulated an enormous mass of data from experimentally depancreatized dogs and from human autopsies, and has been forced to the conclusion that "without disease of the pancreas there is no diabetes." Whether or not this dictum be accepted, it must be admitted that there is a large group of diabetics in which changes in the islands of Langerhans can be demonstrated, and that in these cases the pancreatic insufficiency is responsible for the failure of the carbohydrate metabolism.

In the majority of cases of diabetes mellitus, however, the etiology is obscure; the disease may be attributed to any of a number of factors, such as heredity, obesity, acute infections, arteriosclerosis, etc. In one group, however, of which this patient seems to be an example, the etiology is quite clear. It is apparent, from the anatomic relations between the pancreas and the biliary tract, that abnormalities of the latter may be expected to have an important effect on the conditions of the former. There is certainly a distinct group of diabetic patients in whom there is an associated cholecystitis and cholelithiasis, and most authorities recognize this as an undoubted etiologic class. The mechanism whereby disease of the biliary tract is followed by disease of the pancreas is not clear; lodgment of a stone in the ampulla of Vater or spasm of the sphincter, with the entrance of infected bile into the pancreatic duct, would result in an inflammatory reaction in the pancreas. This type of pancreatitis is usually interlobular and not accompanied by diabetes until late. This is not invariably so, however, as is evidenced by the present case, and by others that are seen in every large diabetic clinic.

The patients are, as is commonly observed in uncomplicated cholecystitis, women above middle age, who have been obese and who have borne children. The symptoms are those of gall-

bladder disease plus those of diabetes. The latter is ordinarily mild and easy to control, and the prognosis is better than in most other types of diabetes. Diagnosis usually presents no difficulties.

Having reached the diagnosis, one is confronted by the question: What should be done about it? It must in the first place be apparent that the diabetes must be controlled by the usual dietetic treatment. If such treatment is not instituted, the patient may be expected to suffer in the same manner as other diabetics, from loss of tolerance or from disastrous complications. Since the diabetes in these patients is, as a rule, relatively mild, there is ordinarily no difficulty in controlling the diabetic state by an appropriate but fairly liberal diet. There is, therefore, no excuse for permitting the persistence of glycosuria.

The indications for surgical treatment of the infected biliary tract may not seem so clear. On the one hand, we have the danger of the operation. This is not negligible in an operation on the gall-bladder of a non-diabetic patient, and the presence of the diabetes renders the surgeon hesitant to agree to the advisability of the operation. On the other hand, one does not seem justified in advising against a procedure which will relieve the patient of pain and discomfort and at the same time possibly improve or at least prevent progression of the pancreatic defect.

Under modern dietetic therapy surgery of the diabetic who is properly prepared for operation is fraught with little if any more danger than accompanies the same operation in non-diabetic subjects. It is, of course, true that in a small group of cases immediate operations, without preliminary treatment, are necessary to save patients' lives when the latter are threatened by an acute surgical condition. In such an emergency delay is unjustifiable, even though the risk of death from the diabetes is great. In the great majority of cases, however, the surgical complications do not demand instant interference, and dietetic treatment should be instituted and a satisfactory adjustment of the food-stuffs obtained before operation is allowed. Freedom

from glycosuria and acidosis must be insisted upon. To submit a diabetic patient with sugar in his urine or with any evidence of acidosis to the dangers of anesthesia, shock, and the other trauma of operative procedure can be justified only if such operation offers him his only chance of survival. Yet this is often done, and by not incompetent surgeons.

On the other hand, it is not fair to the diabetic patient to allow him to continue to suffer from a condition that is amenable to operative treatment. After the patient has been fed a maintenance diet without the occurrence of glycosuria or acidosis for a long enough period of time to make it certain that his metabolic processes are stabilized on that diet, he may be submitted to operation without undue risk. When possible, local or spinal anesthesia should be used. Chloroform should be avoided, and ether used only when unavoidable. Large quantities of fluids by mouth, before and after the operation, are useful in washing out the acid poisoning bodies. If the operation causes vomiting, gastric lavage and other procedures for the control of this symptom should be instituted promptly. Water, rectally or under the skin, should be administered freely. The diet on which the patient has been stabilized should be recommenced as soon after the operation as the subject will take it. Free elimination from the bowel is important.

Using such precautions, one is justified in advising operation directed toward the biliary tract of the patients, of whom Mrs. J. S. is an example. Her convalescence was without event, and the improvement in her general well-being is due in part to the relief of her biliary symptoms.

Case II.—Mr. J. D. B., an American decorator, fifty-nine years old, entered the hospital January 1, 1922, complaining of diarrhea. His family and past histories were of no importance. In April, 1921 he had attacks of shortness of breath and dizziness. Within a few weeks diarrhea developed, with two or three stools each day, and the same number during the night. These stools were described as white and "slimy," and he stated that fat came through undigested. Aside from a feeling of

fulness in the abdomen there had been no other symptoms referable to the gastro-intestinal tract—no nausea, vomiting, pain, jaundice, or loss of appetite. His weight at the beginning of his illness was 149 pounds; at admission to the hospital it was 125 pounds. Except for evidence of marked arteriosclerosis, moderate cardiac enlargement with an accentuated aortic second sound, and edema of the lower two-thirds of each leg his physical examination was negative. *x*-Ray examination of his chest showed no evidence of pulmonary disease. His orthodiagram showed sclerosis of the aortic arch, with an increase in the size of the cardiac shadow. *x*-Ray examination of the gastro-intestinal tract with barium revealed indefinite evidence of trouble in the right upper quadrant of the abdomen not characteristic of gall-bladder disease.

The blood Wassermann was negative. His urine was normal. The blood contained 4,260,000 erythrocytes and 7500 leukocytes per cubic millimeter and 72 per cent. of hemoglobin. The blood-pressure was 105 systolic, 80 diastolic. The stool consisted of a gray solid portion immersed in a mass of fat that resembled melted butter that had hardened. The qualitative test for bile was positive. Microscopically it contained a large quantity of fat, no starch, and a few meat fibers. The duodenal contents showed markedly diminished pancreatic enzymes. Blood-sugar determinations were made on four occasions after the ingestion of 100 gm. of glucose, with the following results:

Date.	January 11th, per cent.	January 14th, per cent.	February 9th, per cent.	February 22d, per cent.
Fasting	0.15	0.12	0.096	0.145
One hour	0.43	0.41	0.37	0.290
Two hours	0.54	0.50	0.400	0.363
Three hours	0.33	0.32	0.312	0.290
Five hours		0.12		

On each test the urine contained sugar.

Beginning January 19th he was given pancreatin, grains 7½, salol-covered capsule, after each meal. Within six days there was a marked improvement in his condition; he stated that he felt much better, his bowels did not move at night, and there was much less fat in his stools. On January 23d the dosage of

pancreatin was increased to 7½ grains before and after each meal. Following this his stools were reduced in number to two daily, and were normal in character. Omission of the pancreatin was followed immediately by a return of the steatorrhea, and its resumption promptly produced normal stools. Tincture of digitalis was also given in doses of 20 drops each three times daily.

Comment.—The diagnosis in this case offers little difficulty. The fatty diarrhea, with the butter-fat stools containing undigested meat fibers, is, in the absence of jaundice, characteristic of chronic interlobular pancreatitis, with deficiency of the external secretion of the pancreas and the resulting lack of digestion of fat and protein. This diagnosis is confirmed by the diminished pancreatic enzymes in the duodenal contents and the prompt relief of the symptoms by specific pancreatic therapy.

It is probable that the accompanying arterial sclerosis is the important etiologic factor in this case. Besides the sclerotic peripheral vessels there was demonstrated sclerosis of the aortic arch. From the increase in the cardiac area and symptoms of cardiac failure we may assume that the coronary arteries were also sclerosed, causing a chronic myocarditis. A similar vascular disease of the abdominal arteries may have caused degenerative changes in the pancreas with replacement of the secretory cells by fibrous tissue. On the other hand, the pancreatic sclerosis might, with reason, be considered part of a general sclerosis, involving the arteries, heart, and other organs, as well as the pancreas.

When arteriosclerosis is the underlying cause of pancreatitis, the history is usually similar to the one given by this patient—insidious onset, fatty diarrhea, and exhaustion without pain. On the other hand, if the chronic pancreatitis is the result of repeated attacks of acute pancreatitis, duodenal ulcer, infection or stone in the biliary tract, or stone or other occlusions of the pancreatic duct, pain, continuously or in attacks, abdominal tenderness and rigidity, jaundice, vomiting, chills, and fever may be important symptoms. Since some of these conditions

are amenable to operative treatment, diagnosis of the primary disease in these cases is important. For those cases which are insidious and run a painless course, as in this case, surgery can do nothing.

The diagnosis of chronic pancreatitis is usually easily made by inspection of the stool. The bulky white stools of chronic pancreatitis have to be distinguished from the clay stools of jaundice. In the latter, as well as in the former, there may be an excess of fat because of the activating effect of bile on the pancreatic lipase; if bile is excluded from the intestinal tract, fatty stools will result. The passage of butter-like masses, usually on the surface of the stool, is pathognomonic of pancreatic disease, and is not met with in jaundice. In the absence of this "butter-fat" the diagnosis may be reached only after demonstration of the deficiency of pancreatic ferments. The latter are found not only in the duodenum, but may be regurgitated into the stomach or appear in the stool. These may be detected by appropriate tests. On the other hand, too little is known of the significance of the absence of pancreatic ferments from stomach or duodenal contents or from the feces to justify a diagnosis of pancreatic disease on this evidence above. Other symptoms and signs of disease of the pancreas must be present.

If a primary disease, such as cholelithiasis or duodenal ulcer, is discovered, this should receive appropriate treatment. Specific therapy, in the form of pancreatic ferments, will usually result in a spectacular subsidence of the symptoms. This is conveniently administered in the form of pancreatin. One dose should be given thirty minutes to an hour after each meal; or two doses, one before and one after each meal, may be found more effective, as was true in this case. Since unabsorbed fat is irritating to the lining of the intestinal tract, it may be necessary to limit fat in the diet to the amount which the patient can assimilate. It may be found desirable to grind the meat. Carbohydrate is usually easily digested and absorbed.

It is usually stated that disturbance of glucose utilization does not occur until late in this form of chronic pancreatitis.

This belief is perhaps due to the fact that careful studies of the carbohydrate metabolism of these patients were not made. It will be noted in this case that there was a decidedly abnormal response to the oral administration of 100 gm. of glucose, shown by the very high elevation of the percentage of sugar in the blood and by the glycosuria. While there are many sources of error in "blood-sugar curves" after the ingestion of glucose, it must be admitted that glycosuria after a dose of 100 gm. (1.8 gm. per kilogram body weight) is not normal. Similar tests may show that lessened ability of utilization of carbohydrate is a usual accompaniment of pancreatic diarrhea.

Case III.—Mr. W. J., an American laborer, entered the hospital December 6, 1918 complaining of weakness and diarrhea. In his family and past histories was nothing of importance. Symptoms appeared abruptly in September, 1913, with polyuria, polydipsia, polyphagia, loss of weight, and increasing weakness. Dietetic treatment was lax and intermittent. In 1916 diarrhea developed and has been constantly present. He stated that he had from two to twelve stools daily. His vision had failed progressively since 1916, and numbness and tingling of the lower extremities had been present since the beginning of his illness. His weight had fallen from 150 to 90 pounds. On examination, extreme emaciation and dryness of the skin were noted. The left side of the chest was dull to percussion and there were numerous coarse, moist râles scattered from apex to base. The abdomen was rigid and tender in the upper and lower right quadrants. The knee reflexes were diminished. The Department of Ophthalmology reported mature cataracts in both eyes. *x*-Ray examination of his chest showed characteristic evidence of chronic pulmonary tuberculosis, with "enormous involvement of the left lung and minor involvement of the right." In the left apex was evidence of a small cavity. His urine contained sugar and acetone bodies, and on a few occasions albumin and casts were found. Hemoglobin, 80 per cent., erythrocytes, 4,530,000; leukocytes, 5700. Blood-pressure: systolic, 110; diastolic, 90. Blood Wassermann negative. Blood-sugar (Benedict), 1000

per cent. by two determinations. Blood urea, 0.028 gm. per 100 c.c.

The patient was in the hospital until his death on September 24, 1919. During most of this time his temperature was normal or subnormal, although there were several periods of a week each when he had an irregular fever, reaching 103° F. During the last few weeks there was a fever every afternoon until the day of his death, when his temperature fell to 95° F. Cough and expectoration increased gradually and tubercle bacilli were found in the sputum. In August, 1919 a furuncle on his back was opened.

Until July, 1919 there was little difficulty in keeping his urine sugar free and his blood-sugar within normal limits. The prompt response of the hyperglycemia to a diet containing protein 15 gm., fat 90 gm., and carbohydrate 9 gm. is interesting; the figures are shown in the following table:

Date.	Time.	Blood-sugar.
December 6	1.00 P. M.	1.000
December 6	7.00 P. M.	0.900
December 7	9.00 P. M.	0.600
December 7	8.00 P. M.	0.300
December 8	12.00 NOON	0.250
December 9	12.00 NOON	0.230
December 9	5.00 P. M.	0.186
December 10	12.00 NOON	0.134
December 11	7.00 P. M.	0.132
December 12	12.00 NOON	0.134
December 13	12.00 NOON	0.134

His diet was increased until he was receiving about 2000 calories daily without glycosuria. In June, however, glycosuria returned, and this time it could not be controlled by dietetic regulation. His whole condition was much worse than it had been at admission, and in view of the failure to check his diarrhea and of the fact that the end was very apparently not far away, the attempt to keep him sugar free was given up, and he was allowed a diet nearly as liberal as he wanted. During the rest of his life his blood-sugar was in the neighborhood of 0.300 per cent. and his twenty-four-hour urinary specimen contained from 50 to 100 gm. of glucose.

The course of the diarrhea was parallel to that of the rest of his condition, except that it was never controlled as well as the glycosuria. His stools were usually liquid and contained large amounts of fat, meat fibers, and vegetable remains. At times, shortly after admission to the ward, it was possible to check the diarrhea by the use of creta. preparat., but later little effect was seen from any drug therapy, although large doses of tannalbin, bismuth subnitrate, and opium preparations were tried. Pancreatin had no important influence on this symptom, and the patient stated that he felt better without it. On the three days of June 25 to 28, 1919, the amounts of nitrogen were determined in his urine and stools at a time when his diet contained 42 gm. of protein and 2225 calories and his urine was free from sugar. The average daily nitrogen content of the urine was 3.19 gm., and of the stools 5.38 gm.; his stools numbered six or more daily and his urine amounted to about 1000 c.c. daily.

On September 24th his temperature fell to 95° F., his respirations became rapid and shallow, and his pulse weak and thready; he sank into a semicomatose state and that night he died. Autopsy was performed at noon the following day. Following is a summary of Dr. A. S. Warthin's pathologic diagnosis: "Chronic interstitial atrophic pancreatitis (congenital syphilis). Chronic pulmonary tuberculosis with secondary infection. Suppurative cavities. Multiple abscesses of the lungs. Atrophy of all organs. General marasmus. Serous atrophy of all adipose tissues. Secondary anemia. Atherosclerosis of aorta."

The description of the pancreas is as follows: *gross examination:* Pancreatic substance greatly reduced in amount. Near head of the pancreas the greatest thickness is 13 mm. and the greatest width 24 mm. Lobules are small, with increase in the interlobular stroma. These changes are uniform throughout the organ."

Microscopic Examination.—"Marked atrophy. Interstitial pancreatitis. Many hypertrophic islands of Langerhans. Numerous fibroid islands."

Comments.—This patient manifested symptoms of both types

of pancreatic disease that were seen separately in the other 2 patients. Histologic examination of the pancreas showed clearly the lesions responsible for these two groups of disturbances.

The atrophy and fibrosis of the glandular tissue proper was productive of the fatty diarrhea with failure of digestion of fat and protein. The stool fat was greatly increased, and many meat fibers were noted. In this connection it is interesting to note his nitrogen output. We have demonstrated that patients with diabetes mellitus, without the digestive failure, are maintained in nitrogen balance by the diet which this patient received during the latter part of June. On such a diet containing 6.72 gm. of nitrogen, the diabetic subject might be expected to excrete daily about 6 gm. of nitrogen in his urine, and about 0.75 gm. in his stools. That this subject's protein metabolism was at a very low level is shown by the small urinary output of nitrogen—3.19 gm. daily. In spite of this he was suffering a daily loss of body nitrogen, since 5.38 gm. were lost daily in his feces. His total nitrogen output was nearly 2 grams more than his daily intake; a daily destruction of 12 gm. body protein is indicated. The small amount of nitrogen normally found in the feces represents the decomposition products of intestinal juices, cellular elements, and bacteria, rather than undigested protein. In the stools of this patient, however, in whom there was failure of protein digestion, the most of the large amount of nitrogen was derived from undigested food.

The fibrosis of the islands of Langerhans was responsible for the defect in the carbohydrate metabolism. His symptoms were those characteristic of acute diabetes in young subjects: abrupt onset, polyuria, polydipsia, and increased appetite; some of the usual diabetic complications were seen in the neuritis (lost reflexes, numbness, and tingling of the extremities), cataracts, and furunculosis. One cannot doubt the symptomatic identity of this manifestation of his pancreatic disease with the usual case of diabetes mellitus. The pancreatic lesion was, however, progressive, and rigid dietetic control, which ordinarily avoids downward progress in the diabetic patient, failed

to prevent a rapid decrease in the ability of this patient to utilize glucose until his diabetes became "total."

This is the usual history of patients with deficiency of both the external and the internal secretion of the pancreas. They cannot digest fat or protein. Carbohydrate is digested and assimilated, but because of the failure in the intermediary metabolism it is not utilized. Slow starvation follows and the disease ends fatally.

CLINIC OF DR. GEORGE R. HERRMANN

UNIVERSITY HOSPITAL, ANN ARBOR

THE DIAGNOSIS OF ENDOCARDITIS

THE patient whose case history will be presented for discussion shows some striking and comparatively unusual findings which call attention to important points that must be considered in the differential diagnosis.

Case History.—A section-hand, aged twenty-seven, presented himself at the Out-patient Department, complaining of a dull pain in the abdomen, of loss of appetite, weight and strength, and of fever and chills.

His **present illness** began quite insidiously about a week before admission, with some abdominal distress, a dull pain in the lower epigastrium, and a sense of fulness. These symptoms were worse after meals, but there was no belching of gas or vomiting. He had lost his appetite and had noted general weakness.

He had painful and slightly swollen knee- and ankle-joints, and dull aches in other joints for a few weeks about eight months before admission. He had suffered from occasional sudden sharp pains in the left side of the head, with some vertigo, and also from occasional sharp pains in the left side of the abdomen. A crop of reddish-purple spots had appeared over the shoulders and on the legs. At about the same time he noted polyuria and nocturia for a few weeks and a red color of the urine occasionally.

For some three months he had severe chills practically every morning, with a subsequent high febrile reaction. Drenching night-sweats were also present. He had long oozing nosebleeds and frequent bleeding from the gums. He had lost 28 pounds in weight within a year. He had to give up his heavy work at the very onset of his symptoms, while all work had to be given up

with the onset of fever and chills, and for a month he had been confined to his home.

The **past history** failed to reveal any evidence of a previous attack of rheumatic fever during childhood or adolescence, of chorea, tonsillitis, growing pains, scarlet fever, diphtheria, gonorrhea, or syphilis. In 1917, five years before admission, he had had a severe attack of whooping-cough which kept him in bed for a month and disabled him so much that convalescence was unusually prolonged. He had had a mild attack of influenza in 1918.

He had smoked about ten cigarettes a day. He had consumed alcohol in moderate amounts and had been occasionally intoxicated. His habits were otherwise good.

The eye, ear, nose, and throat history was negative except for the dozen or so attacks of epistaxis and the bleeding of the gums.

Cardiorespiratory: He had noted palpitation and slight dyspnea on exertion. An unproductive cough had also been somewhat troublesome.

Gastro-intestinal: Aside from the symptoms, in the present illness, referred to the abdomen, there had been no symptoms except those of chronic constipation.

The genito-urinary and the neuromuscular histories contained no relevant or positive facts.

In summary, then, in chronologic order the patient has had: abdominal distress, anorexia, weakness, arthritis, sharp headaches with vertigo, sharp pains in the left upper quadrant, petechiæ, bladder symptoms, probable hematuria, chills, fever, night-sweats, epistaxis, and cough.

Practically every one of these symptoms is of major importance and suggests a group of causes. Certain combinations of the symptoms narrow the list of possibilities down to a few diagnoses. The fundamental rule of differential diagnosis, however, is to account for all symptoms and signs in each case by one diagnosis. In this process the findings that are inconsistent with this or that disease picture are the facts that pave the way to the correct conclusion.

What diagnoses are suggested by the above case history? A chronic infectious process must certainly be present, but what is the etiologic agent and what the situation of the lesion? Chronic pulmonary tuberculosis with a more recent acute miliary dissemination might account for everything except, perhaps, the petechiæ. Chronic purpura, with visceral and arthritic symptoms, as suggested, would scarcely account for even the petechiæ, for the latter appear too infrequently and are not extensive enough in this case, and finally are not exactly characteristic of purpuric lesions. Subacute phlebitis, pyelonephritis, or endocarditis are possible diagnoses that cannot be confirmed or rejected by the facts in the patient's history alone.

With this short consideration of the story a more definite, intelligent, and differentiating objective study of the patient may be undertaken, rather than a blind routine physical examination. The suggested provisional diagnoses require confirmatory evidence of one and negative evidence for the others.

The **physical examination** shows a thin, emaciated, asthenic individual of small stature, holding himself in a strained attitude. He has adenoid facies, with a very pinched expression. There is some pallor and a sallow pigmented complexion.

The right pupil is larger than the left, but both are regular and react promptly. The scleræ are clear; the conjunctivæ are free from abnormalities and the fundi appear negative. There is no photophobia, lacrimation, strabismus, lidlag, exophthalmos, puffiness, or diplopia. The ears show no discharge, stigmata, or tophi, and a watch is heard with ease at a distance of a meter from either ear. There is no mastoid, frontal, ethmoidal, or maxillary tenderness.

The nasal mucosa is covered with dried blood from the recent epistaxis. The mouth shows sordes, painful and bleeding lips, retracted and bleeding gums, a high arched palate, a few small white plugs in the tonsils, and several crowned and devitalized teeth.

There is some stiffness of the neck and movement causes pain. The thyroid isthmus is enlarged. The cervical glands are palpable. The neck veins are not engorged, but there is considerable pulsation at the base.

The thorax is small, narrow, and flat, with flaring costal margins. The skin over the shoulders and about the clavicles shows pigmented areas which suggest fading petechiæ. The percussion note over the apices is impaired and the breath sounds are harsh; otherwise the lungs are negative.

The Heart.—Considerable pulsation is seen over the whole precordium and in the second right interspace and along the right sternal border. The cardiac impulse is diffuse and slapping and extends from the third to the sixth I. C. S. and laterally to the anterior axillary line. A long, strong systolic thrill is felt along the right sternal border from the second interspace to the base of the neck. The P. M. I. is in the fifth I. C. S., 12.5 cm. to the left of the midsternal line. The cardiac dulness extends 13 cm. to the left and 3 cm. to the right. The aortic dulness measures 5.5 cm. in width.

The second sound at the pulmonary area is accentuated moderately, the aortic second sound is distant and impure. The first sound at the mitral area is strong and fairly sharp. The second sound is distant. There is a pulse-rate of 120 per minute and the rhythm is regular.

Auscultation reveals a loud, rough, aortic systolic murmur transmitted into the neck vessels, and a high-pitched aortic diastolic murmur transmitted to the apex and even accentuated along the left sternal border. A high-pitched apical systolic murmur replaces the greater part of the first heart sound and is well transmitted toward the axilla. There is a questionable rumbling late diastolic murmur at the apex.

The blood-pressure is 96/74.

The radial and brachial vessels are soft and easily compressible.

The *abdomen* is enlarged and slightly convex, with slightly greater prominence on the left side. The panniculus is very scant and the veins show very distinctly. The spleen is considerably enlarged, extending down to the level of the umbilicus. The liver border likewise extends some 4 cm. below the costal margin. Tenderness is present about the umbilicus and in the gall-bladder region. There is no definite evidence of ascites.

The arms are thin. The fingers are distinctly clubbed and cyanotic.

The legs are likewise thin and the anterior surfaces are covered with petechiæ.

The reflexes are normal. The temperature is 102° F.; pulse, 120; respirations, 22

The **urine** contained a trace of albumin, many coarsely granular casts, white blood-cells, and red blood-cells.

The **blood examination** revealed 50 per cent. hemoglobin, 3,800,000 erythrocytes, and 2500 to 2000 leukocytes, and the differential count showed no gross abnormalities.

The subsequent history of this patient will be given in a note at the end of the article.

Discussion.—The objective findings of significance are the pallor, slight pigmentation, and emaciation; the aortic and probable mitral disease; the splenomegaly and liver enlargement; the clubbed fingers and petechiæ; the secondary anemia and leukopenia; the evidence of renal irritation, and especially the presence of red blood-cells in the urinary sediment.

The practically negative lung examination makes tuberculosis quite improbable, and the absence of local signs causes one to abandon the idea of a phlebitis or thrombophlebitis. The lesions on the legs have irregular yellowish-pink centers and hemorrhagic borders, and are, therefore, apparently embolic phenomena rather than purpura.

The evidences of cardiac valvular lesions with the long history of fever and chills, gastric disturbances, epistaxis, weakness, and pallor are sometimes considered sufficient basis for the diagnosis of endocarditis. That other data are necessary I hope to emphasize by some interesting case histories. The clubbed fingers, enlarged spleen, and liver—though unusually huge in this case—and the petechiæ and red blood-cells in the urine add considerable probability to the diagnosis of an endocarditis, and, in fact, differentiate the type with some degree of accuracy. Subacute rheumatic endocarditis with exacerbations is ruled out by the presence of the enlarged spleen, which may be accepted as the result of repeated infarctions with vegetations from

the heart valves, as embolic phenomena do not occur in the case of pure rheumatic valvulitis uncomplicated by thrombi. The whole picture fits in with that of the subacute streptococcic endocarditis which has been brought to our attention most emphatically in this country by the thorough and extensive studies of Emanuel Libman.

To account for each abnormality discovered in this patient as a part of the one disease process and to satisfy all of the essential requirements of this one diagnosis are our next problems. The mode of onset, the symptoms, and signs all agree perfectly well with the clinical picture of a subacute streptococcic endocarditis. The spleen, however, is unusually large, but this finding has been commented upon by others who have reported cases of subacute streptococcic endocarditis that has been mistaken for primary blood and splenic conditions. The enlargement of the liver is considered to be the result of the infection and a moderate degree of heart failure. The clubbing of the fingers and toes likewise seems out of proportion to that ordinarily present. The patient insists that he has never had any pains in his finger-tips and that the clubbing has taken place since the onset of his present trouble. However, the clubbing may have been the result of a chronic cardiac valvular disease, which apparently has been present, but has been symptomless, and for which there has been no known etiologic infectious process discovered. Subacute bacterial endocarditis usually attacks valves that have been damaged by previous infection, especially rheumatic fever. Occasionally, also, valves which are the seat of old syphilitic, arteriosclerotic, or congenital lesions are also attacked. A latent rheumatic aortic insufficiency or a mitral stenosis, as in our case, with absolutely no history of rheumatic fever, chorea, growing pains, or tonsillitis, is a finding that is not at all uncommon.

What further examinations would you now undertake to establish the diagnosis beyond a doubt? A positive blood-culture containing the non-hemolytic streptococcus or perhaps the Bacillus influenzæ would complete the picture. Sometimes the organisms are not easily grown from the blood. Occasionally

even an expert will fail repeatedly, while another will be successful at the very first culture. The reaction of the media and the oxygen tension no doubt play some part in this. On the other hand, a positive culture in itself is not diagnostic of an endocarditis, for it is possible to have a non-hemolytic streptococcic bacteremia from a focus such as a uterine infection, sinusitis, tonsillitis, or apical abscesses. From the bacteriologic side alone repeatedly positive cultures at intervals and a positive autogenous complement-fixation test and the absence of a focus are necessary to make the diagnosis of an endocarditis reasonably certain. In conjunction with the characteristic clinical features, however, a positive blood-culture is almost pathognomonic.

Would repeatedly negative blood-cultures in the case presented disprove for you the clinical diagnosis? What would such a report stimulate you to do? The positive clinical symptoms and signs are so numerous in this case that it would be practically impossible to convince one that this is not a case of subacute bacterial endocarditis; nevertheless, a persistently negative blood-culture would call for a complete re-examination of the case in every detail and a reconsideration of the differential diagnosis.

Negative blood-cultures induce reconsideration of provisional diagnoses more often than any other symptom or sign and stimulate more careful studies, with consequently more correct and reliable final diagnoses, as a review of a few selected case histories will show. The 4 cases (II, III, IV, and V) all had some type or other of systolic murmur and some signs of cardiac embarrassment, together with fever, chills, great prostration, anemia, and urinary findings. The combinations certainly warranted the provisional diagnosis of possible subacute bacterial endocarditis. However, further studies that followed the repeatedly negative blood-cultures resulted in changes in the diagnoses, which were substantiated by the anatomic findings.

PURPURA HÆMORRHAGICA WITH VISCERAL AND ARTHRITIC PAINS AND PETECHIAL HEMORRHAGES, SIMULATING SUBACUTE BACTERIAL ENDOCARDITIS, WITH THE NOT UNCOMMON ONSET WITH SEVERE SHARP PAINS

A MAN aged forty-five years was sent into the surgical ward as an "acute abdomen" because of sharp pain in the epigastrium slightly to the right of the midline. He was transferred to the medical ward as a questionable case of endocarditis.

He had had the various types of venereal disease including a possible syphilitic infection at the age of twenty-four. He had lost 20 pounds of weight within a year.

He had been struck over the vertex one month previous to admission. Erysipelas had developed and an alopecia had resulted. He had noted a soreness in the bones and joints and had felt generally below par after that.

His **present illness,** in his opinion, however, had begun suddenly when he was awakened from a sound sleep at 2 A. M. the day of admission, with a pain in the epigastrium a little to the right of the midline. It "cramped him into a knot," did not radiate, but remained localized, steady, and sharp. The pain was less intense when he lay on his back, but rolling around was necessary to ease it entirely. About one hour after the onset he began to vomit, bringing up at first the food taken at supper, then a bad-smelling brown material, but no blood so far as he knew. He vomited everything taken by mouth after that. There remained a dull pain or soreness in the epigastrium. He had no definite chills or fever. His bowels were moving regularly. The pain gradually increased in intensity until it was very severe. The pain came in paroxysms, especially after movement.

The **physical examination** revealed pallor, petechiæ in the mucous membranes, and some ulcerations in the mouth.

The heart was not enlarged. The heart rate was increased to 115 per minute. Systolic murmurs were heard in the aortic and mitral areas.

There was tenderness in the epigastrium and the liver edge extended 1 cm. below the rib margin.

The temperature was 99.8° F.; the pulse 130, and respirations were 24.

The **laboratory examinations** showed a secondary anemia, albumin, red blood-cells in the urine, and blood in all excreta.

Course in the Hospital.—Occasional shooting pains were noted in the joints and in the subdeltoid bursæ, and the inner condyle of the right humerus became painful. A group of petechiæ (75–100) appeared between the eighth and tenth ribs. The clotting time, bleeding time, and the platelet counts were normal.

Blood-cultures remained sterile. The petechial spots became generalized. Subcutaneous hemorrhagic areas then appeared over all the joints and pressure points. The clotting time was three and one-quarter minutes. The bleeding time was prolonged to ten minutes. The platelets were reduced to 52,000. A consolidation of the whole right lung and lower lobe of the left developed. The temperature rose to 101° F. and the leukocytes numbered 22,000 to 25,000. The patient became more and more toxic and died seven days after admission.

The **clinical diagnoses** were: Purpura hæmorrhagica with intestinal and joint lesions; lobar pneumonia; edema of the lungs; syphilis, and aortitis. The clinical diagnoses were confirmed by postmortem examination. The heart at autopsy was negative except for one subendocardial hemorrhage.

Discussion.—In patients who have endocarditis severe epigastric pains with vomiting are not uncommon symptoms at the onset of the disease. Purpuric lesions indistinguishable from those of true purpura may be found in endocarditis cases. The blood findings at the onset were not those characteristic of purpura hæmorrhagica; later, however, they became so. The negative blood-cultures as well as the progress of the skin lesions prompted the repetition of the blood examinations, which

more or less fixed the diagnosis. The presence of a purpuric rash necessitates the careful consideration of the cause of symptomatic purpura in the differential diagnosis. Other blood conditions, especially severe secondary or pernicious anemia, when accompanied by fever, often present real diagnostic difficulties.

MULTIPLE PULMONARY INFARCTIONS AND THROMBOSES; THROMBOPHLEBITIS AND MYOCARDITIS WITH CARDIAC FAILURE; FEVER, CHILLS, ANEMIA, ALBUMIN, CASTS AND RED BLOOD-CELLS IN THE URINE; ENLARGED LIVER AND QUESTIONABLY ENLARGED SPLEEN; THAT IS, A CLINICAL PICTURE OF AN ENDOCARDITIS

A MARRIED woman aged thirty-three was admitted with the complaint of cough and shortness of breath.

She had had scarlet fever four years before admission.

Her **present illness** began with dyspnea and edema during the late months of pregnancy. She was admitted on the obstetric service where she was delivered of a full-term still-born infant under scopolamin-morphin anesthesia. The delivery was normal, but the patient was very dyspneic and orthopneic during and after the delivery. She also had edema of the face, feet, and lungs after delivery, with tachycardia, gallop rhythm, and a weak radial pulse. She suffered from paroxysms of coughing, marked dyspnea, and cyanosis, during which the pulse became weak and thready.

The **physical examination** revealed pallor and slight cyanosis. The signs of moisture and consolidation appeared in the right lung anteriorly and in both lungs posteriorly. The heart was apparently slightly enlarged. The heart rate was 120 to 150 per minute. Auscultation disclosed gallop rhythm, an apical systolic and a questionable presystolic murmur.

The abdomen was slightly distended. The liver edge was tender, soft, and boggy and palpable down to the umbilicus. There was resistance in the splenic region, but no definite edge was made out.

Laboratory Examinations.—The urine contained albumin, casts, pus-cells, and red blood-cells. The kidney function was reduced. The blood examination showed a secondary anemia. The sputum was blood-streaked, but otherwise negative.

Course in the Hospital.—The cardiac findings did not change to any noticeable extent. On the fifth day a swelling of the right side of the neck appeared, with redness, heat, and tenderness, and a swelling of the arm and hand followed. The next day there was tenderness in the calf of the left leg. She had frequent attacks of intense dyspnea with collapse, and dissolution often appeared imminent.

The signs of consolidation in the lungs became more pronounced. The patient's dyspnea gradually increased. Cheyne-Stokes' breathing developed. There was profound weakness, nausea, and vomiting. The temperature was remittent between 99° and 102° F., chills were not infrequent, and the pulse-rate remained about 130 per minute. Blood-cultures were consistently negative. The temperature was 104° F., pulse 150, and respiration 50 on the night before her death, which occurred the twenty-fourth day postpartum.

The **clinical diagnoses** were: Acute nephritis of pregnancy, thrombophlebitis of the left subclavian vein and the left popliteal vein, myocarditis, pulmonary infarctions, pneumonia in the right upper lobe, resolving bronchopneumonia of the left lower and the right lower and middle lobes of the lung, chronic passive congestion of the liver.

The **postmortem study** showed: Chronic passive congestion of the liver, acute splenic engorgement, bilateral pleural effusion which amounted to 350 c.c. on the right, multiple infarctions of the lungs with bronchopneumonia, thrombosis of the aorta and both pulmonary arteries. The pericardial fluid was slightly increased in amount.

The *heart* was greatly distended with blood and appeared considerably enlarged. The muscle weighed 320 grams. The valve leaflets were smooth and absolutely normal.

Discussion.—The myocardial and pulmonary symptoms were out of all proportion to the clinical and even to the anatomic cardiac findings. An endocarditis would have accounted for the picture quite well, but the persistently negative blood-cultures and the absence of petechiæ made the diagnosis doubtful. A positive blood-culture, which might well have been present as

a bacteremia from a postpartum uterine infection, would have led us to a false conclusion. The early findings were doubtless due to thrombosis as a result of the blood stasis incident to the cardiac failure. The paroxysms of dyspnea might well be accounted for by repeated pulmonary infarctions. Thrombophlebitis is always confusing, especially when it is present in a deep-seated vein such as the internal iliac vein. A case of this type, ushered in with a sharp pain similar to the pain described in Case II, but in the pelvis this time, and an apical systolic murmur, was wrongly interpreted until engorged superficial collateral veins in the groins became apparent. Repeatedly negative blood-cultures led to further search that revealed the findings upon which the correct diagnosis was finally made.

PYELONEPHRITIS IN A WOMAN WITH A CONGENITAL DEFECT OF THE INTERVENTRICULAR SEPTUM. A RASPING MURMUR OVER THE MIDSTERNUM IN A PATIENT WITH A SLIGHT CLUBBING OF THE FINGERS AND AN ANEMIA, FEVER, AND CHILLS, ARE SUFFICIENT SIGNS TO MAKE THE DIAGNOSIS OF ENDOCARDITIS QUITE TENABLE

An unmarried female, aged thirty-three, was admitted complaining of chills and fever for five months, a loss of appetite, weight, strength, and color.

In her past history she had had scarlet fever and, during convalescence, the physician noticed a loud heart murmur. Her heart had never been examined before, so that she did not know whether the lesion causing the murmur had been present previous to the scarlet fever or not. At any rate, she had never previous to, at the time of, or after the infectious disease had any cardiac symptoms.

The **present illness** had begun five months before admission with the sudden onset of fever and chills; the latter had occurred about every third day and later every day at different times of the day. At about the same time she had begun to have severe pains in the left side at the base of the axilla and in the left upper quadrant, or the splenic region. She had been in a hospital for six weeks, during which time a diagnosis of pleurisy had been made. The symptoms had subsided, but she had not regained her strength. She had journeyed north for the summer, and while there her chills had begun again. Blood-cultures had failed to yield any organism. The chills and fever had persisted, the patient had lost her appetite, had lost weight and strength, and had become pale and sallow. The chills had become less severe, but the fever rose to 104° or 105° F., and nausea and vomiting became troublesome.

The **physical examination** showed pallor with slight sallowness

and some emaciation. Many apical abscesses were discovered. The tonsils were enlarged and apparently septic. There was an oozing epistaxis.

The *heart* was apparently not enlarged. There was a systolic thrill over the manubrium, most intense in the midsternal line. A loud rough systolic murmur could be heard throughout the chest, but was loudest over the base, with the point of maximum intensity in the midsternal line at the level of the third intercostal space.

Abdominal palpation revealed nothing but tenderness in both upper quadrants and in the flanks.

Extremities.—The finger-tips were slightly but definitely clubbed and faintly cyanotic.

The **laboratory findings** were quite significant. Blood-cultures were repeatedly negative. The blood showed secondary anemia. The blood non-protein nitrogen was 91 mg. per 100 c.c.

The urine contained a large amount of albumin, blood, and pus. No casts were found. The phthalein output was zero in two hours. Ureteral catheterizations yielded pus containing Gram-negative bacilli from each kidney.

Course in the Hospital.—The chills subsided, but the fever continued between 99.5° and 103° F. Attacks of epistaxis continued to come on. The secondary anemia became very severe. The blood non-protein nitrogen rose to 208 mg. per 100 c.c. and uremic stupor intervened. A blood transfusion afforded temporary relief.

The **clinical diagnoses** were: Pyelonephritis, congenital heart disease, severe secondary anemia, gangrenous stomatitis, and uremia.

The **pathologic diagnoses** were: Suppurative nephritis with multiple abscesses, chronic glomerular nephritis with a large smooth kidney, congenital heart disease with a patent interventricular septum, fibrinous pericarditis with pericardial exudation, subepicardial hemorrhages, petechial hemorrhages into the stomach, hypertrophy of the spleen with focal necrosis, fibrinous perisplenitis and perihepatitis, secondary anemia, and gangrenous stomatitis.

The Heart.—The pericardial fluid was increased in amount and cloudy from flakes of fibrin. The epicardium showed areas of fibrinous deposit and evidence of inflammation. The valves were smooth and thin and normal in every way.

There was an opening through the membranous portion of the interventricular septum. This opening measured about 6 mm. in diameter and allowed fluids to pass quite readily from one ventricle to the other.

Discussion.—The fact that the heart murmur was first heard after an attack of scarlet fever was somewhat confusing at first, since we immediately thought of a streptococci or rheumatic lesion which is practically always necessary as a prerequisite for an engrafted subacute streptococci endocarditis. The unusual position and character of the murmur and the accompanying thrill, the absence of evident enlargement, and electrocardiographic findings strongly supported the possibility of a congenital defect. The repeatedly negative blood-cultures gave further support. The rather rapidly rising blood nitrogen content was quite unusual and could not be accounted for as the result of renal embolism and the characteristic glomerular nephritis. The ureteral catheterizations (during the cystoscopic examination) yielded pus and blood—sufficient evidence of a suppurative kidney disease. The suppurative kidney lesion accounted for the blood nitrogen retention and the anemia, and the latter accounted for other symptoms and signs. The clubbed fingers were probably the result of the congenital heart lesion.

ACUTE RHEUMATIC ENDOCARDITIS UPON CHRONIC CARDIAC, MITRAL, AORTIC, AND TRICUSPID DISEASE. CARDIAC FAILURE WITH AN APPARENT EXACERBATION OF THE INFECTION AND COMPLICATIONS FOLLOWING A BLOOD TRANSFUSION

A GIRL aged seventeen was admitted complaining of shortness of breath and pain over the heart.

In her past history she had had acute rheumatic fever at the age of nine. She had had mild attacks of sore throat occasionally. She had not been able to go to school because of "St. Vitus' dance." Chorea had been so severe at the age of ten that she had been unable to feed herself; the condition had continued until the age of thirteen, when it stopped and had never returned.

The **present illness** had begun six months before admission with a severe attack of joint trouble, with much pain, swelling, and fever. She had been in bed for two weeks and convalescent for four weeks longer. She had returned to work and had felt well until four months before admission, when the symptoms had returned and had persisted with pains in the knees, weakness, dyspnea, and loss of appetite. Three days before admission she had had severe pains in the heart, with fever and increased dyspnea, which symptoms had brought her to the hospital.

The **physical examination** showed a pale, thin, cyanotic girl, slightly dyspneic, coughing, and perspiring. The cervical glands were enlarged, but not tender.

The heart was enlarged. A blowing systolic murmur and a questionable diastolic murmur were heard in the mitral area and also at the aortic cartilage. A superficial "scratch" was heard over the lower sternum. There were a Corrigan pulse and a pistol-shot sound in the femoral artery.

The abdomen was negative except for tenderness on palpation in the splenic region.

The **laboratory examinations** revealed a severe secondary anemia and a moderate leukocytosis. The urine was negative. Blood-cultures were negative.

Course in the Hospital.—Cough and dyspnea persisted, with an irregular fever of 98° to 103° F. and a pulse-rate of 120 per minute. The marked anemia did not improve. A transfusion of 400 c.c. of citrated blood was given. A severe reaction ensued, with increasing cyanosis, a severe chill, and a fever of 103° F. Cough with a bloody sputum persisted. Dulness with distant bronchial breathing and râles was found in the right axilla and back. Diffuse petechiæ and ecchymotic areas developed over both arms, the left side of the trunk, and the right buttock. Small septic skin lesions, questionably embolic, became generalized three days after transfusion. The symptoms and signs of heart failure progressed rapidly until the degree of edema and congestion was extreme.

The **clinical diagnoses** were: Acute rheumatic endocarditis; chronic cardiac valvular disease; mitral stenosis and insufficiency and aortic insufficiency; cardiac failure with tricuspid regurgitation; cardiac hypertrophy and dilatation; pericarditis(?); pulmonary thromboses and infarcts, especially on the right.

The **pathologic diagnoses** were: Chronic rheumatic endocarditis of the aortic, mitral, and tricuspid valves with acute warty vegetations of the type characteristic of rheumatic endocarditis; cardiac hypertrophy and dilatation; pulmonary thromboses and edema, atelectasis of the left lung; bilateral hydrothorax; ascites; anasarca; chronic passive congestion of the viscera; fatty degeneration of the liver, early aortic arteriosclerosis; uric acid infarcts in the kidneys. Cultures of the heart blood and the vegetations were sterile.

Discussion.—The case illustrates the contention of some cardiologists: "once rheumatic, always rheumatic." The infectious process on admission might well have been a subacute bacterial endocarditis engrafted upon an old rheumatic lesion. The presence of a pericarditis, however, made a subacute bacterial infection alone highly improbable. The acute cardiac failure following transfusion was accompanied by evidences of throm-

botic and embolic phenomena, skin lesions and fever, and suggested more than a flare-up of the rheumatic infection. The blood-cultures, however, remained sterile and the postmortem cultures and section of the rather large vegetations were likewise free of organisms.

CONCLUSIONS

The diagnosis of subacute bacterial endocarditis in cases with persistently negative blood-cultures must be made only after thorough study of the case which presents some of the characteristic signs.

One positive blood-culture is not to be considered sufficient basis for the diagnosis which has such a grave prognosis, unless symptoms and signs fit into the picture.

Cases II and III illustrate the fallacy of considering too seriously a systolic murmur over the heart in cases with fever. Diastolic murmurs always demand more serious consideration and certainly lend considerable weight to the diagnosis of a subacute bacterial endocarditis.

Cases IV and V emphasize the importance of securing exact details in the physical examination. The murmur of the congenital heart lesion might easily have been misinterpreted had fewer facts been elicited. The diagnosis of an exacerbation of rheumatic endocarditis was made because of the absence of evidences of embolism and infarction before the onset of cardiac failure.

Six cases of Streptococcus viridans septicemia were observed along with the above cases. Besides the repeatedly positive blood-cultures aortic diastolic murmurs were heard in all cases. In two instances the character of the murmurs changed while the patient was under observation. Evidence of embolism, especially of the spleen, was present in every case. Three of the cases were examined postmortem and the aortic and mitral vegetations were found attached to thickened valve leaflets. Tricuspid vegetations were also present in one of the cases. Positive blood-cultures had been obtained with comparatively little difficulty in these cases. This fact makes the repeatedly negative blood-cultures of considerable significance.

The facts necessary for a diagnosis of subacute bacterial endocarditis are principally these: The signs of a definite organic heart lesion, of a prolonged sepsis with fever and anemia, and of embolism. Positive blood-cultures added to the above findings make the diagnosis practically certain.

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A CASE OF UNUSUAL PYLORIC OBSTRUCTION AND ALKALOSIS WITHOUT GASTRIC TETANY

GASTRIC tetany, first described in detail by Kussmaul[1] in 1869, may occur as a complication of any variety of pyloric obstruction. Associated clinically with distention of the stomach (sometimes enormous), with copious vomiting and denoting a grave prognosis, the etiology of its production and the rational method of prevention and treatment long remained undetermined. Recent experimental and clinical investigation, however, has thrown considerable light on the relationship existing between it and other forms of tetany, and has discovered, associated with it, the existence of other pathologic changes in the body which may play a part in the mechanism of its production.

Kussmaul explained the condition simply on the basis of the extreme dehydration resulting from the vomiting. It was early suspected, however, that something more than the mere loss of fluid was responsible. Koreczynski and Jaworski[2] in 1891 suggested that the tetany was due to the loss of chlorin in the gastric secretion. Kaufmann[3] in 1904 called attention to this theory, emphasized the possibility of its correctness, noticed decreased chlorid excretion in the urine, and suggested treating these patients by injections of sodium chlorid. In 1914 Kaufmann[4] also pointed out that the theory of Koreczynski and Jaworski was supported by the claim of Bouveret and Devic[5] that tetany occurred only in those cases with a hypersecretion of acid. Experimentally Taylor,[6] several years ago, described tetany occurring in dogs in which the gastric secretions were allowed to escape by way of an external fistula, and suggested

that it was due to the loss of some necessary constituent of the body which was normally returned to the body by way of the intestine.

In 1918 McCann,[7] during a study of the gastric secretion of dogs with tetany, observed that in dogs in which the pylorus had been obstructed in various ways there was an increase in the plasma carbon dioxid capacity coincident with the development of tetany. Although holding the evidence inconclusive, he suggested that the alkalosis might result from a loss of the acid in the gastric secretion, a theory made more attractive by the decrease in the alkalosis following gastro-enterostomy in one animal, by the relief afforded in 2 cases by the injection of hydrochloric acid into the duodenum, and by the coincident increase in the secretion of hydrochloric acid with the increase in the carbon dioxid capacity.

MacCallum and his associates,[8] reporting in 1920 work begun as early as 1909, similarly found an alkalosis in such animals, and also observed a decrease in the blood and urine chlorids and an increase in the electric excitability of the nerves. According to these authors' findings the tetany may be prevented by the continuous administration of sodium chlorid, although it is much less easily cured by such treatment. On the other hand, experiments with the intravenous injection of hydrochloric acid met with but little success. They were also able to cause temporarily an alkalosis and symptoms of tetany by the injection of sodium carbonate or bicarbonate.

Grant,[9] in a recent clinical study, reports 3 cases of tetany occurring in patients with pyloric obstruction in whom there was an increase in the alkaline reserve and a decrease in the blood chlorids. He holds that the alkalosis is due to the excess base left in the blood after the formation of hydrochloric acid according to the formula $NaCl + H_2CO_3 = HCl + NaHCO_3$, and the subsequent loss of the acid by vomiting. As additional evidence in favor of the relation of the alkalosis to the tetany he also reports the occurrence of tetany associated with alkalosis due to overdosing with sodium bicarbonate and to the excessive washing out of carbon dioxid by hyperpnea.

Unfortunately recent work has been less successful in determining the relation of gastric tetany to other forms of tetany. Its relation to the tetany produced by the administration of sodium carbonate or sodium bicarbonate, or by the washing out of carbon dioxid by hyperpnea has already been discussed. The occurrence of an alkalosis in parathyroid tetany has been affirmed by McCann[7] and by Wilson and his co-workers,[10] but MacCallum,[8] Togawa,[11] and Hastings and Murray[12] were unable to confirm this finding.

In infantile tetany Howland and his associates[13] have found disturbances in the calcium metabolism. However, MacCallum[8] was unable to find any characteristic change in the fixed and soluble calcium ratio in dogs with gastric tetany. He also states that injections of calcium had only a temporary beneficial effect in these animals. Both MacCallum and McCann suggest a disturbance in the sodium, potassium, calcium, magnesium balance as a possible explanation of the symptoms of gastric tetany. Recently Freudenberg and György[14] have claimed that all forms of tetany are due to a disturbance in the calcium metabolism. This disturbance they assert may be the result of different causes, among which is a change in the acid base equilibrium such as occurs in gastric tetany. This work has not been confirmed, nor is it generally accepted as yet. It is interesting to note that still more recent work[15] by these two authors suggests that there may exist an alkalosis in cases of infantile tetany.

In view of the results of recent experimental work as reviewed above, the findings in the case I wish to report today are of considerable interest.

REPORT OF CASE

H. S., a male, single, sixty-seven years of age, and a teamster by occupation, came to the hospital complaining of weakness, loss of appetite, and pain in the stomach.

The **present illness** began three months ago, at which time he began to have a severe, constant pain which he localizes in the region of the midepigastrium. The pain persisted, and although less severe for a time, it became worse than ever shortly

before entering the hospital. Two days before admission he became confined to bed. Until one week before entrance his appetite remained fairly good. He lost weight from the onset of his illness, a total of 16 pounds. He vomited but six times before admission, the first time six weeks previous to entry. On each occasion he vomited a coffee-ground material and considerably more than he had eaten at the previous meal. His bowels had been constipated, but the stools were not tarry and he noticed no fresh blood in them. At no time had the patient been jaundiced.

Past History.—He admitted having had the usual diseases of childhood without complications and an attack of inflammatory rheumatism twenty-five to thirty years ago. His eyesight had been failing rapidly and he had been told he had cataracts. The cardiorespiratory system was essentially negative. He had had no gastro-intestinal trouble before the onset of his present illness. Some years ago he had passed bloody urine for two days, the cause of which he was ignorant. This symptom never recurred. There was no history of neurologic disturbances nor had he had any serious accidents or operations. His habits were good.

Family History.—The father and mother died at advanced age of causes unknown to the patient. One brother died of cancer of the rectum.

On **physical examination** the patient was seen to be underdeveloped and of small stature, with evidence of recent loss of weight. He looked extremly ill. The examination of the head revealed no abnormal finding. The eyes were negative in all respects. The nose and ears were negative externally. The lips were of fair color, the teeth were absent, and the tongue protruded in the midline without tremor. The tonsils were not seen, but the pharynx was red and injected.

Examination of the thorax showed deep but equal supraclavicular and infraclavicular depressions. The breathing was extremely shallow. The heart findings were normal, but there was considerable amount of peripheral arteriosclerosis. The lungs showed dulness at both apices, more marked on the right,

and on auscultation there were heard over the right apex posteriorly and below the clavicle and in the axilla anteriorly showers of fine crackling râles. An occasional râle was heard over the left apex.

Examination of the abdomen was difficult because of the semirecumbent position which he assumed to obtain greater comfort. The lower portion of the abdomen was protuberant and on the first examination simulated the presence of free fluid. The lower superficial veins were dilated with the flow of blood in the normal direction. By palpation the patient was found to be extremely tender in the region of the gall-bladder, and it was thought that there was felt a hard tumor a handbreadth below the costal margin just to the right of the umbilicus. Its exact nature was indefinite. The spleen was not palpable. An enlarged prostate, with nodules in the right lobe, was felt on rectal examination. The genitals, the extremities, and the neurologic examination were normal.

Laboratory examinations showed an acid urine, specific gravity 1.025, without albumin or sugar, and with a negative sediment. The hemoglobin was 85 per cent. (Sahli), the red cells numbered 3,930,000, and the white cells 9500. There was an increase in the polymorphonuclear neutrophils (73 per cent.); otherwise the differential count was normal. The red cells and the platelets appeared normal. The blood-pressure was 108/76. An *x*-ray examination, made about thirty-six hours after admission, showed an enormous, aperistaltic stomach with complete obstruction, which was considered to be due to a malignant lesion. No filling defect was seen.

Course.—Subsequent examination showed a definite, hard mass which seemed to involve the pylorus, liver, peritoneal glands, and other adjacent structures. Peristaltic waves were seen passing from right to left across a greatly dilated stomach. Jaundice was never observed.

The patient remained on the medical service four days. During that time he vomited enormous quantities of a dark brown or greenish fluid, on each occasion vomiting from 2 to 3 liters. He complained of marked abdominal discomfort which

was relieved by vomiting. His appetite was fair, but he ate only a small amount because of the distress it caused him. At no time were any symptoms of tetany noted, nor were Chvostek's or Trousseau's signs elicited. On the third day after admission the carbon dioxid combining power of the blood-plasma was 86.2 volumes per cent. On the fourth day after admission he was given 600 c.c. of normal sodium chlorid solution subcutaneously. On this day he was transferred to the surgical service for operation, during which he received a second infusion of 1200 c.c. of the salt solution. The patient rallied somewhat following the operation, but died ten hours later.

At **autopsy** there was found a large adenocarcinoma of the head of the pancreases, with multiple metastases to the liver, intestines, mesentery, peritoneum, and retroperitoneal lymph-nodes. While not involving the stomach wall, the mass in the pancreas had caused obstruction of the pylorus. There was not an anatomically complete obstruction of the stomach, the pylorus admitting the little finger, but due to the enormous dilatation of the stomach there was a kink in the pylorus giving complete functional obstruction. Other pathologic findings were as follows: There was early sclerosis of the coronaries and patches of fibrosis of the syphilitic type in the wall of the left ventricle of the heart. The aorta showed advanced atherosclerosis and a syphilitic type of mesaortitis. In the lungs there were healed hyaline tubercles and a purulent lobular pneumonia. There were fibrosed, calcified, and active tubercles in the bronchial nodes. A marked degree of pancreatitis of the chronic interstitial type was found and in the liver there were miliary tubercles. The kidneys showed healed anemic infarcts. A mixed laminated thrombosis of the right iliac vein was found together with a thrombosis of the prostatic plexus. There were patches of old syphilitic orchitis and a chronic pancreatitis.

Comment.—This case presents a number of interesting features. The occurrence of a carcinoma of the head of the pancreas with an entire absence of jaundice throughout the course of the illness is in itself extremely rare and unusual. Another uncommon finding is the pyloric obstruction caused by a carcinoma of the

pancreas not involving the stomach wall. In regard to this finding it is interesting to recall that the *x*-ray findings revealed no filling defect.

Another group of interesting features is the presence of pyloric obstruction, gastric dilatation, copious vomiting, and an alkalosis without the developement of tetany. While it is unfortunate that an examination of the gastric contents and the blood chlorids was not made, reports of similar cases make it almost certain that the body chlorids were reduced and that there was probably a hypersecretion of hydrochloric acid.

Why did this patient not develop tetany? Several factors may explain it absence. It will be remembered that the patient had vomited but little previous to his entrance into the hospital. Experimental work on animals has shown that tetany develops in from two to five days after complete obstruction in animals which are not fed, while in animals which receive some food through the duodenum the onset of symptoms may be delayed for a week depending on the amount of food (chlorids) they receive. It will likewise be remembered that there was not a complete anatomic obstruction of the pylorus, hence the obstruction due to the kink may have been a late development, a partial obstruction only having previously existed. The injections of the sodium chlorid may have been a factor in preventing the development of tetany, as was observed in the work of MacCallum[8] on dogs. Finally, in regard to the presence of an alkalosis without the presence of tetany, McCann[7] has shown that the development of the alkalosis precedes the onset of the tetany.

In view of the tendency at present to treat patients who present the picture of severe vomiting and dehydration by oral administration and injections of solutions in which are incorporated alkalies and by gastric lavage, a word of warning in regard to treatment may be advisable. These two types of treatment will increase the alkalosis. While the present experimental work would indicate that the fundamental treatment lies in the surgical removal of the obstruction, it is probable that the poor results obtained in the past, which have been urged by some as an

argument against operation, may have been due to the poor preoperative condition of the patients resulting from the alkalosis. The procedure recently reported by McCann[16] presages the possibility of putting this type of case in a better preoperative condition. On the bases of Haldane's[17] work on the production of acidosis in man by the oral administration of ammonium chlorid, McCann has succeeded in reducing the carbon dioxid capacity to normal and in causing the disappearance of tetany in a case of pyloric obstruction by the intravenous injection of ammonium chlorid.

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MEDICAL TREATMENT OF PEPTIC ULCER WITH GASTRIC RETENTION

There is probably no subject in modern medical literature which has provoked more discussion than the proper treatment of peptic ulcer and its various complications. The period is not long past when the surgeon and internist were very much at logger-heads over who could most efficiently treat these cases and who could show the greater proportion of cures. We have learned, however, that we must employ teamwork in the handling of these cases if we are to succeed in restoring our patients to the degree of health which they deserve. I do not believe that at present any reputable surgeon wishes to operate on a recent ulcer or one which has not had a reasonable trial of medical treatment. On the other hand, no internist with a conscience should delay in referring to the surgeon any patient with a chronic ulcer which has not greatly improved on a fair trial of dietary treatment, or who has had repeated relapses from such treatment. We are also beginning to realize that even though the case is one requiring surgical interference, it is important that the internist control the patient both for preoperative diagnosis and treatment, and for postoperative treatment. This is postoperative treatment in its broadest sense, extending over months and perhaps years, for we all should realize that no operated ulcer case should be discharged with the advice that he is now cured and can eat anything he wishes. Such advice in the past has done much to discredit otherwise excellent surgery. Surgery, at best, is only part of the cure.

Even though both surgeon and internist are handling these

cases in a much more reasonable manner than heretofore, there are certain types of cases concerning which we find it hard to decide if medical or surgical treatment is advisable. I believe this is particularly true of peptic ulcer with gastric retention.

I wish to present for your consideration today 2 cases in which this symptom complex is present, and which emphasize rather well certain rules that should be observed in handling such problems.

Case I.—The first patient is a young man, twenty-three years of age, a farmer by occupation, who first entered the University Hospital December 24, 1921 because of pain in the epigastrium and vomiting. His past history is uneventful. His family history is unimportant and his habits are exemplary.

His present trouble apparently began about six months previous to his entrance to the hospital, and was first noticed as a dull pain which came on two to three hours after meals. This pain he described as usually being in the lower abdomen. This was relieved by soda and by food. He did not vomit at this time, but felt weaker than usual. These symptoms remained practically unchanged until four weeks before his entrance, when he began to have pain in the epigastrium of a burning nature. This pain has been accompanied by nausea and vomiting, the vomiting usually coming on one or two hours after meals. At times he has vomited in the morning food which has been eaten the night before. He has never vomited blood, but has a rather indefinite history of tarry stools. His weight at the beginning of the trouble was 171 pounds; at entrance his weight was 156 pounds.

Physical examination was negative with the exception of the abdomen, which showed marked fulness in the epigastrium. No peristalsis could be observed. There was some generalized abdominal tenderness, more marked in the midepigastrium, also slight muscle spasm on deep palpation in the epigastrium.

Gastric analysis, by the fractional method, showed a fasting residue of 300 c.c., containing food from the night before and many bacteria. No Boas-Oppler bacilli. The free HCl was

10, total acids 40. The specimens removed after the test meal showed only a moderate hyperacidity, the last specimen being the highest, and showing free HCl 63, total 78. The stools showed a strongly positive benzidin test for occult blood. The blood Wassermann and urine were negative. The blood showed some concentration, there being 5,900,000 red blood-cells.

Fluoroscopic examination showed about a 6-ounce residue twelve hours after a barium meal. Barium lactone was given and there was observed a secretion zone, a hyperkinetic hypertonic stomach with peristalsis of the three-wave type. The cap could not be demonstrated, though barium was seen to flow rather freely through the second portion of the duodenum. Flat plates taken at various intervals showed, in addition to the finding already noted, considerable hypermotility of the small bowel and a very poorly outlined cap.

Our diagnosis was, of course, duodenal ulcer with partial pyloric obstruction. The question which arose was whether surgery was demanded to relieve this obstruction. It was felt that because of the comparatively short history of the trouble there was good reason to believe that the obstruction was largely due to reflex pylorospasm, with probably some edema of the pylorus. It did not seem reasonable to believe that there was enough scar formation to produce the obstruction. We therefore decided to institute medical treatment. The patient was put to bed and a modified Sippy régime ordered. The vomiting continued for two days, then ceased entirely. The pain also disappeared in a few days, and he was subjectively much improved. After two weeks of this treatment he was again *x*-rayed, showed no gastric residue even on the six-hour plate, and there was practically normal motility of the small bowel. There was, however, still inability to demonstrate the cap satisfactorily. After one more week of hospital treatment he was allowed to return home, as he was a very tractable, intelligent patient who co-operated very well with his treatment. Since then he has reported at frequent intervals and apparently is entirely free from symptoms. We believe, however, that he should continue under medical treatment for at least one year.

I think that this case illustrates that certain types of retention respond very definitely to medical treatment, and that all cases of not too long standing deserve at least a trial of such treatment. I do not believe that a gastro-enterostomy or pyloroplasty would have given this patient as efficient a digestive apparatus as he now possesses, or one which was any less liable to recurrence of the trouble.

Case II.—This patient is a farmer, aged sixty-six, who was first admitted to the University Hospital February 13, 1922, and also had the chief complaint of pain in the epigastrium and vomiting.

His family history is not important. He had typhoid fever as a child, but has had no other acute disease. His present illness began fifteen years ago with slight pain in the midepigastrium, which came on between meals and was relieved by food and by soda. The trouble was not constant, but tended to come in attacks, and he has observed that he is apt to have much more trouble in the winter. During the early year of this trouble he did not vomit. The trouble continued much the same for a number of years, with perhaps a slight tendency to become more severe. At times he has had some adjustments of his diet by his physician, with no relief.

About one year ago he noticed a decided increase in his symptoms. The attacks became more frequent and were more severe. There was, however, one period of eight months during which he was comparatively free of symptoms. About two months before entrance to the hospital he began to have persistent vomiting, which more often occurred at night. This was of considerable amount and contained food eaten during the day. Soda still relieves the pain, but food does not. He has never vomited blood and has never observed tarry stools.

Physical examination showed evidence of loss of weight and also evidence of rather marked dehydration, the tongue was dry and coated and the skin was dry and harsh, though of a rather good color and did not have a cachectic appearance. The heart and lungs were negative; there was considerable peripheral

sclerosis. In the abdomen an immensely enlarged stomach could be mapped out, across which at frequent intervals could be seen passing very vigorous waves of peristalsis.

Laboratory examinations gave little information of value. Hemoglobin was 88 per cent.; red blood-cells 4,390,000. Possibly both were a little high, due to loss of fluid. A gastric analysis was not done.

We had, therefore, a typical picture of chronic peptic ulcer with plyoric obstruction, although the age of the patient would of necessity demand a consideration of the question of beginning malignancy.

x-Ray examination confirmed our diagnosis. It showed an enormously distended stomach, marked hypertrophy of the musculature with hyperperistalsis, which proceeded to the pylorus. There was almost complete retention at twenty-four hours.

This patient also presented an interesting problem as to how his condition could best be improved. Could medical treatment hope to benefit this patient as decidedly as the preceding one, or would surgery be more efficient? Because of the evident chronicity of the ulcer with the high degree of retention it was felt that medical treatment could offer no hope of permanent cure. The patient, however, did not appear to be a good surgical risk, and it was decided to attempt to improve his condition to a point where he could be safely operated on.

He was accordingly placed in bed in the Medical Ward, put on a modified Sippy régime, with some additional forcing of water. This afforded him almost instant relief from his nausea and vomiting, and shortly from his pain. Most remarkable of all however, was the fact that in the fifteen days he was in the Medical Ward he gained 15 pounds in weight. His vessels became full, his color improved, and his temperature, which had been subnormal, became normal. The enormous distention of the stomach largely disappeared and peristalsis could no longer be seen. There was, in fact, a most astounding subjective improvement. He was again *x*-rayed, and in spite of the subjective improvement there was still found a rather marked degree of

retention, though quite considerably less than on the previous examination.

As it was evident that surgical interference would be necessary to obtain any permanent relief, and as the patient was now an excellent surgical risk, he was transferred to the Surgical Service where a large annular duodenal ulcer was found close to the pylorus and a posterior gastro-enterostomy done. He made a most satisfactory convalescence and ten days after operation was ready to return home. Previous to leaving the hospital he returned to the Medical Service for careful instruction in regard to his diet. It was made quite plain to him that he did not have a normal digestive canal, and that if he wished to enjoy good health he must observe care in his diet and life. He is to report at frequent intervals for observation and advice.

I believe these 2 patients illustrate very well how the problem of the medical treatment of peptic ulcer with gastric retention can best be handled. In cases similiar to No. 1, with a young individual and a comparatively short history, we can hope by medical treatment to relieve the patient entirely of the retention and ultimately cure the ulcer. Usually in this type there is not an actual mechanical obstruction due to scar tissue, but rather what might be termed a functional obstruction due to pylorospasm and edema. Not all cases of this type will yield as quickly to treatment as the patient presented and may require more heroic treatment. Atropin is often of value in relaxing the pylorospasm. While it was not done with this patient, it is usually better to wash out the stomach through a tube each evening. Rest in bed is very important. It must not be forgotten that when the retention has cleared up and the patient leaves the hospital the treatment has only begun, for the ulcer has not been cured, and until that is accomplished our work is not finished.

The second patient is also a distinct type, an older individual with a long history of ulcer and a rather high degree of retention. These patients we cannot hope permanently to improve by medical treatment, as the obstruction here is largely due to scar formation and is a real mechanical obstruction. However, while

the internist cannot hope to cure, he can do the patients a very real service in properly managing their preoperative treatment and then put them in the best possible shape for operation, and he can also do them a real service in intelligently managing their diet and life after surgery has done its part.

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Clinics by

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CLINIC NUMBER 1

CLINIC OF DR. D. MURRAY COWIE

TUBERCULOSIS OF GLANDS AND BONES—HELIOTHERAPY AND QUARTZ LIGHT THERAPY

Dr. Cowie: You heard the baby crying in the anteroom. As I sat there I realized I could not give this clinic satisfactorily if the baby continued to cry. I had the baby rolled into the amphitheater with the thought that in all probability he had been brought up in a baby carriage, and the rolling would stop the crying, or that perhaps, as the child is now twenty months old, seeing your faces might, in some psychologic way, combined with the rolling, stop the crying. At any rate, we are glad to have the child quiet, as there are some things I am anxious to show you.

I purposely digress at this point from the topic under consideration for the sake of calling your attention to one of the most important things over which I feel those who have anything to do with the management of children should have control. That is, how the baby shall be cared for by the mother, by the nurse, or by the maid.

Personally, I am opposed to babies being wheeled about on the street or lulled to sleep by rocking. There are two reasons for this opposition. First, babies establish habits very quickly. If a baby is rocked in a cradle or wheeled about in a buggy he will form the habit of wanting this done on all occasions whether it is convenient or not. That means from ten to twenty months of more or less constant disturbance in the home, and it may contribute to the production of a spoiled child, of which we see so many. The other reason is that by wheeling on the street for fresh air they more easily pick up contagious diseases and infections of various sorts. You cannot always trust a nurse or a maid or even the proud mother, who naturally wishes to exhibit her beautiful child to those of her friends who may be passing by. The usual attention that ensues, patting the cheek with contaminated hands, kissing with unclean lips, exposes to contact infection. The baby can get fresh air in the backyard just as well as on the street. If he is wheeled or placed in his buggy in the yard, in a proper place, with relation to sun and wind, there is no reason why he should not stay there a great part of the day. Usually if he is started right he will be as anxious to live this way as he is to be moved about. So I encourage people to keep their babies in the open air, in the sun, as much as possible, but quiet.

It is not at all improbable that if this plan had been followed in the present case the condition from which this child suffers may not have been as advanced as it is; possibly it may not have occurred.

Now to the case. Mr. Blank, I have had this child brought into the clinic room without having seen him before. I don't know any more about this patient than you do. Let us consider the case from the standpoint of a patient who has just come into your office. As Dr. Parsons knows all about the case, and as he has brought the patient in, let us look upon him in the rôle of a parent from whom we may want certain information. As you look at the child lying on the table what impression do you get?

STUDENT: I get the impression of a pefectly healthy looking

child. The child is well nourished, the arms are well filled out. The cheeks have a good color. The child impresses me as being well.

DR. COWIE: That is just what I hoped you would say, because without seeing the affected portions of the body I think all of you will agree with Mr. Blank that this is quite a normal, healthy looking baby of twenty months. However, not withstanding this, potentially at least, this child has a very serious disease, from which at any time he may become acutely ill and die within a short time. Will you look the baby over?

STUDENT: There is a sinus in the right neck. There are two openings.

DR. COWIE: How would you describe this affection of the neck?

STUDENT: The lower opening is larger than the upper opening, and is reddened and looks more acutely inflamed, and from it there is a slight discharge.

DR. COWIE: How about the color of the upper opening?

STUDENT: The upper opening is more of a dusky red to bluish color.

DR. COWIE: If you look at the lower edge of the wound I think you should have also said that the edges protrude slightly. There is a slight induration and thickening as compared with the surrounding tissue. Under what conditions do you get a sinus tract in this location?

STUDENT: It might be a brachial cyst.

DR. COWIE: Yes. A brachial cyst, however, is usually a little lower, although there might be a cyst opening even at this point. The opening of a brachial cyst is not as large as this opening, but I will admit that very frequently brachial cysts which are not well cared for by the parent or the nurse show redness at the external opening of the duct that leads from the cyst to the skin, and sometimes almost as much inflammation about the orifice as you see here. As we are quite sure that this is not a brachial cyst, what condition would suggest itself to you as the most probable cause of this lesion?

STUDENT: Tuberculosis of the lymph-glands.

DR. COWIE: Yes. The chronic looking wound, the discoloration of the skin, particularly of the apparently older lesion, makes you think of a tuberculous lesion which, as you know, is very much more inclined to leave a discolored spot or scar for a long time, than lesions due to other causes.

In tuberculosis of the lymph-glands what other portions of the body do we examine quite closely?

STUDENT: The bronchial glands.

DR. COWIE: Yes. Anything else?

STUDENT: The bones.

DR. COWIE: It is an interesting fact that tuberculosis of the glands is frequently associated with tuberculosis of the bones. So as I uncover this child's lower extremities you will see a plaster dressing from the lower third of the thigh to the lower third of the leg. Dr. Parsons, will you tell us something about the history of this patient?

DR. PARSONS: The patient has been in this hospital for sixteen months. He came to the hospital because of enlarged glands in the neck. At the time of examination we noticed a small scar over the knee which the father or mother had not observed very closely and did not think amounted to very much. After examination it was determined that this was the site of a sinus. This was opened by the orthopedic surgeons, and since that time several sinuses have been opened up and drained. The child has had plaster dressings on the knee changed at proper intervals from that time to the present time.

There seems to be a tendency at the present time to get away from the idea of dyscrasias, diatheses, etc. Not many years have gone by since the older clinicians would call this a case of scrofula, and those who were careful about the use of that term differentiated between skin lesions which were not tuberculous and which were frequently called scrofula and this syndrome, which is characterized by the peculiar habitus of the patient, full, rather stout conformation of the body, thickened lips, enlarged glands, and oftentimes associated with sinus tracks from the glands, blepharitis, and suppurative disease of the bones. I think it is still well to remember the peculiar char-

acteristics of the various habits. The phthisical habitus, for example, while predisposing to or possibly initiated by the same organism, differs from the scrofulous habit. A regard for these things I think makes the study of disease processes much more interesting. For example, a patient walks into your office, or you see a woman walking down the street. There is a certain amount of interest that comes to you when because of her step, her body poise, her tout ensemble, you make the guess that her right kidney is down, her tenth rib is detached, and that her greater curvature is below the navel.

I said that potentially this was a serious case. The probability is, however, that this patient will recover without any serious result except the damage which has already been done to the tissues involved. That seems to be the course of a large majority of cases of glandular and osseous tuberculosis. However, there is always the possibility of the organism being carried to other glands situated in what we may call a danger zone, such as the bronchial glands which you mentioned. From the bronchial glands the lung tissues may become involved, or the infection passing down the glands in the neck may involve first the upper pleura and then by extension the lung tissue. We may have developing an ordinary pulmonary tuberculosis, a tuberculous pneumonia, or, a more serious thing, an acute miliary tuberculosis which would kill the child in a comparatively short time.

You have seen so many cases of this kind that I will not go into the examination of the case further except to ask you how you might determine the extent of the glandular involvement if, supposing you were in the country, away from a hospital, away from the advantages you might obtain from the use of an *x*-ray machine.

STUDENT: I would examine the back of the chest carefully for the appearance of the D'Espine sign and for changes, particularly in the whispered voice.

DR. COWIE: The D'Espine sign would not necessarily tell you it was tuberculosis. It might tell you that there was something between the air-passages and the chest wall which transmitted the breathing sounds to the ear more closely. This

might be a dense substance. It might even be a softer substance, a slightly catarrhal exudate. In the latter case, after coughing or after a few hours, the sign will disappear. I have seen this occur more than once. At times we get a positive D'Espine sign when we are unable to demonstrate anything in the chest by means of *x*-ray and *vice versa*. We must not place too much reliance upon this sign in the diagnosis of glandular involvement and other similar conditions in the chest. We should look upon it simply as one of the aids to diagnosis, one of the things that help us formulate a more or less definite idea of what is going on in the body.

This is an undoubted case of tuberculosis of the glands and the bones of the right knee. I cannot resist to put in at this point another word in favor of our belief in this clinic, that infants who from necessity have to be hand fed should be given only cooked or heated milk. Belief in this method is strengthened by the somewhat recent investigation by Park and his co-workers. In the examination of 97 cases of tuberculous adenitis 49 per cent. were shown to be due to bovine infection. The important thing now is to plan and consider what is the best method of treating the patient. What treatment would you suggest?

STUDENT: I would place the child in a sunny room, keep him in the window as much as possible, give him good food and hygienic care.

DR. COWIE: What benefit would you expect to get from such treatment?

STUDENT: It is well known that sunlight is a great factor in curing tuberculous processes.

DR. COWIE: Is there any other way you could get the sunlight?

STUDENT: No other way here, but if the child could be sent to a warmer climate he could be put out of doors.

DR. COWIE: What is the difference between sunlight out of doors and sunlight indoors?

STUDENT: There is more of it out of doors.

DR. COWIE: That is, of course, true, but it is not quite the point. Is there anyone in the class who can offer the reason why sunlight out of doors is better than sunlight indoors?

STUDENT: The glass window might interfere.

DR. COWIE: In what way might it interfere? Or, perhaps, I had better ask, what do you understand by sunlight from a therapeutic viewpoint?

STUDENT: The light from the sun.

DR. COWIE: Yes, I know, but how do you analyze the sun? What is the sun made up of?

STUDENT (puzzled).

DR. COWIE: Which illustrates to me that probably they have not had instruction in heliotherapy, from the standpoint of a knowledge of how the sun benefits these conditions.

Light comes to us in the form of waves, vibrations, or frequencies. The sun's rays are of different lengths, of different frequencies. For example, if we allow a beam of light to filter through a simple prism, it will be divided up, deflected, or refracted; we will see all the colors of the spectrum from violet to red. This is what we call the visible spectrum. So far as we know, these waves or rays are of little or no benefit in the treatment of disease. Do you recall any other term that is used to describe light that is known to be of therapeutic value?

STUDENT: The actinic rays.

DR. COWIE: Yes. The actinic rays or the chemical rays. Do you recall any special chemical ray that is popularly used in the treatment of disease?

STUDENT: The ultraviolet rays.

DR. COWIE: Yes. These chemical rays belong to what we might call an invisible spectrum. The ultraviolet rays are probably the most potent rays that are employed in the treatment of disease processes. The sputum in the street, infected material thrown into the street, we have known for a long while soon becomes inactive. This is due to the direct rays of the sun, to the sterilizing ultraviolet rays. We have also thought that luminous rays themselves hinder the growth of bacteria, hence the idea of having our incubators dark. On the other hand, we have seen bacteria grow in incubators heated with an incandescent lamp from which at least all the luminous rays are not cut off.

Time does not suffice to go into the theoretic reasons and some of the known reasons for the benefit obtained by the use of heliotherapy. It has been only within a comparatively few years that we have known how to use the sun's rays. In many institutions throughout the country large solariums have been constructed with the idea of curing infectious processes by having the patients exposed for varying lengths of time to the sun's rays, which in winter, in most places, come through glass windows. It is a well-known fact that glass does not cut off the heat rays. It is also a well-known fact that the heat rays penetrate much farther into the body than the cool violet rays. These heat rays can be obtained from artificial sources, such as the incandescent lamp. In the treatment of intertrigo, for example, many physicians report excellent results from the use of the incandescent lamp of ordinary power. They allow this lamp to shine on the affected parts for a long period of time. Other clinicians have tried this same procedure, and feel that they produce no benefit. I have made this observation. Frequently I have found people using the incandescent lamp with the hope of getting benefit, and receiving none. On questioning, I have found that they resort to the newer type of incandescent lamp. This brings up another question with regard to sunlight—artificial sunlight. The luminous rays are very much more powerful when electricity is run through a tungsten filament. Through such a filament we procure a more luminous light, but very much less of the infra-red rays. On the other hand, from a lamp with an ordinary carbon filament the greatest amount of heat rays is procured. Do not forget that if you are going to use the heat rays (infra-red) for therapeutic effect you must use the lamp with a carbon filament, that you must see that your patient does not slip in a tungsten or a tungsten nitrogen bulb.

Heliotherapy is better carried on at high altitudes for the simple reason that here we are more likely to be above the clouds, above the smoke, and above things in the atmosphere which cut off the chemical rays. It is surprising how small a particle intervening between the body and the source of light will cut off the

chemical rays from that portion of the body, for example, a skin scale or a dust particle. I feel quite sure that the beneficial effect produced by sending tuberculous patients to high altitudes comes more from the sunlight than from the altitude itself, more from the clearness of the air which permits the sunlight to come through to the body. Should these patients live at these altitudes in the nude state they probably would become cured of their infectious processes very much more readily than they do by the common custom. Under these circumstances, at such altitudes as elsewhere, only the face, hands, and arms are exposed to the sun's rays. Heliotherapy institutions in Sweden and in Switzerland have been organized where children may live the year round in the open air and sunshine. This, combined with good food, in a comparatively short space of time accomplishes wonderful results. The children are permitted in the wintertime to play out in the snow with nothing on save a diaper, and shoes to hold their skates and skees or snow shoes. It would be impossbile to treat this child in that way, because he has not been built up to that sort of exposure. The thing that would most likely happen if this child were put out in the snow today would be the development of a neuritis, a sudden chilling, or the development of some serious respiratory condition.

We would like to treat this child with sunlight. Can anyone make a suggestion as to how this may be brought about?

STUDENT: By the use of a lamp, an ultraviolet lamp.

DR. COWIE: What is the principle of the ultraviolet lamp?

STUDENT: Delivering ultraviolet rays.

DR. COWIE: In Finsen's early work he used an ordinary arc light. He and others had found that the ordinary street arc light was very powerful in ultraviolet rays, particularly if iron electrodes were used instead of carbon. He had rooms in which several of these lights were burning, and patients came and sat or lay under the lights. Later on, as it became known that the ultraviolet rays would penetrate through quartz, lamps were constructed which deliver a light rich in ultraviolet rays through a quartz tube or window. Estimations seem to show that more ultraviolet rays per minute are produced by this

means than would be obtained by exposure to direct sunlight at very high altitudes. Under the influence of this method of treatment cases of this sort, as well as cases showing tuberculous processes in the lungs, are very frequently greatly benefited. As I said before, time does not suffice to go into a discussion of why the light accomplishes this result or whether we have any explanation yet as to why the light acts so favorably in this certain type of disease. The work that has been done on rickets with quartz light therapy demonstrates that marked changes in metabolism take place. You will find in most tuberculous sanatoria at the present time, even though they are situated at high altitudes, the frequent use of ultraviolet light obtained from artificial sources.

I must say a few words more, particularly because of articles appearing in more or less recent magazines by one who once dwelt with us, but was not of us, for his knowledge of medicine was meager, being limited to the narrowness that is likely to develop in one who works only in a laboratory with test-tubes and guinea-pigs, trying for the greater part to imitate or induce in these little animals diseases they are not accustomed to have, rather than the much more important study of diseases they are subject to by their peculiar constitution, if I may use that word. These articles because of their piquant, virile, sturdy phraseology might lead some of you to slacken up on some idea you have gathered during your sojourn with us; some idea that is formulating in your mind, not formulated. I say to you go on, and, as an example, think of the man who made it possible for us to use the method of treatment we have been considering this afternoon. Finsen, after graduation, was appointed to the professorship of physiology and anatomy at the University of Copenhagen. While a student he became interested in the therapeutic action of sunlight. The salary was not great enough to enable him to progress with his studies, so he resigned, to devote all his time to the practice of his profession and research on light. Think of him traveling from house to house thoughtfully attending to the sick and in the hours between developing his contribution to "medical science." May you all at least make the effort to

contribute something. Then you may reverse the opinion voiced by our bright young scientist. Finsen received the Nobel prize of $40,000. He did not keep it, but gave one-half of it to the light institute which he founded.

Doctor O'Donnell has 2 cases you have seen before on which he wishes to make a final report.

CLINIC OF DR. WILLIAM S. O'DONNELL

ACUTE LYMPHATIC LEUKEMIA[1]

ACUTE lymphatic leukemia, as mentioned in the text-books, is said to be a rare disease in childhood. Two cases have presented themselves at the Children's Clinic of the University Hospital within the last four weeks.

Case I.—Baby M. is two years old. He was brought to the hospital on account of weakness and sudden attacks of fever. His parents are healthy. The baby was born at full term. Labor was normal. He was breast fed for nine months, and has since been fed on a rational diet. At nine months he had an otitis media and a cervical adenitis, which continued for four weeks. Two months previous to his admission to the hospital he had measles, followed by bronchopneumonia. Since that time the child has not been well. His appetite has been poor. He has a fever at intervals lasting from two to four days. When the fever is present he vomits everything he takes.

Physical Examination.—A male child, temperature 101.4° F., pulse 140, respirations 20. The skin hangs in folds, showing that there is a marked loss in weight. There is a purplish discoloration of the skin from an old hemorrhage at the right outer canthus. There is another purplish discoloration of the skin the size of a quarter at the angle of the mouth, and similar discolorations over both legs. The head is of good shape. Eyes and ears are normal. The lips are pale. The mucous membranes of the mouth are pale. The teeth are in good condition. The tonsils are hypertrophied. The anterior and posterior groups of cervical glands are enlarged. They are plainly noticeable on inspection. The glands are the size of almonds. They are hard,

[1] From the Department of Pediatrics and Infectious Diseases, University of Michigan, Ann Arbor.

discrete, and are not attached to the skin. The chest shows a slight rachitic rosary. The lungs are negative throughout. There is a soft systolic murmur heard at the apex. It is not transmitted. The abdomen rises above the costal margin. The liver extends 5 cm. below the costal margin in the right axillary line. The spleen is palpable midway between the costal margin and the crest of the ilium. No other masses can be felt. The genitalia are normal. The extremities are normal. The epitrochlears, inguinal as well as the cervical glands, are enlarged. The urine is pale, acid, specific gravity 1.016, and contains neither albumin nor sugar. The sediment shows many urates. The cutaneous and intracutaneous tuberculin tests are negative.

Blood Examination. — Red blood-cells, 2,960,000; white blood-cells, 11,000; hemoglobin, 27 per cent. (Sahli).

Differential count: Polymorphonuclears, 3 per cent.; eosinophils, 1 per cent.; large lymphocytes, 88 per cent.; small lymphocytes, 8 per cent. Blood-platelets, 80,000. Clotting time, eighteen minutes.

The *x*-ray findings in the chest show nothing abnormal.

For the past week the child's temperature has ranged from 100° to 104° F. He had a nasal hemorrhage on the day of entrance to the hospital

Diagnosis.—The appearance of the child is that of one who is acutely ill. The high temperature, the generalized adenitis, the purplish discolorations of the skin from old hemorrhage, the bleeding from the nose, the enlarged spleen with the blood-picture showing an increase in the lymphocytes, the decreased platelets, and the prolonged coagulation time are the factors which we think enable one to make a diagnosis of acute lymphatic leukemia of the aleukemic type.

Case II.—Baby K., aged eighteen months, entered the clinic on account of enlargement of the cervical glands. The family and birth histories are negative. The child was on the breast for three months and then put on a formula. She had no previous illness until six months before entrance to the clinic. The child had a cough and a profuse nasal discharge followed by enlarge-

ment of the glands of the neck. The glands have remained the same size for the past six months. There has been no suppuration. The child has had a constant cough for the past six months. She has had a persistent fever for the past two weeks.

Physical Examination.—The child appears acutely ill and very pale. The temperature is 103° F., pulse 120, respirations 28. She is fairly well developed and nourished. There is a purplish discoloration on the skin below the left ear, and similar discolored areas on the abdomen and over both lower extremities. The cervical glands on both sides are enlarged to the size of hen's eggs. They are hard, discrete, not tender, and free from the skin. The head is of good shape. Eyes and ears are negative. There is a slight mucopurulent discharge from the nose. The lips are pale. The mucous membrane of the mouth bleeds easily when touched. Two teeth are carious. Over the hard and soft palate many small petechial hemorrhages can be seen. The tonsils fill the pharynx. The chest shows a moderate rachitic rosary. There is dulness along the spine to the sixth thoracic vertebra. On percussion and auscultation the lungs are negative. Bronchial breathing can be heard along the spine to the sixth thoracic vertebra. The abdomen is level with the costal margin. The liver is just felt at the rib margin. The spleen is palpable 2 fingerbreadths below the costal margin. The genitalia are negative. There is a generalized lymph adenopathy. Extremities are normal. Reflexes are normal. The urine is pale, specific gravity 1.012, no albumin or sugar. The sediment is negative. Cutaneous and intracutaneous tuberculin tests are negative.

Blood Examination.—Red blood-cells, 1,560,000; white blood-cells, 82,000; hemoglobin, 30 per cent. (Sahli).

Differential count: Polymorphonuclears, 3 per cent.; large lymphocytes, 80 per cent.; small lymphocytes, 12 per cent.; transitionals, 5 per cent. Blood-platelets, 120,000. Coagulation time, thirteen minutes.

x-Ray Department reports on the chest examination a well-defined dense shadow in the mediastinum. It is smooth in contour. The shadow is posterior to that of the heart and extends high up into the neck. *x*-Ray diagnosis: Mediastinal adenitis.

Diagnosis.—In this case the generalized adenitis, ecchymotic areas on the skin, bleeding from the mucous membranes, enlarged spleen, and the blood-picture establish a diagnosis of acute lymphatic leukemia.

Discussion.—In both cases presented here there is a history of onset following the course of a long-standing acute infection. The fever has been continuous. There has been marked weakness. Hemorrhages have occurred in the skin and the mucous membranes. There has been a generalized lymphadenitis and an enlarged spleen. Accompanying these conditions there was a severe and rapidly developing anemia. Death followed in two to eight weeks. This is the characteristic clinical picture found in acute lymphatic leukemia.

The enlargement of the lymph-glands need not necessarily be of great degree before considering a diagnosis of leukemia. Any acute infection with or without enlargement of the glands, associated with hemorrhages into the skin and mucous membranes, calls for the consideration and exclusion of this diagnosis.

The diagnosis always depends finally on the blood-picture. The leukocyte count may be either low or high. There is a variance in the leukocyte count in the different cases, also in the same case from day to day when the blood-picture is followed closely. The second case presented has a high leukocytosis and the first case has a leukocyte count at the lower limit of normal for children. This type of the disease is often described under a variety of names, such as acute pseudoleukemia, aplastic leukemia, aleukemic leukemia, and aplastic anemia. The lymphocytes are always increased, ranging from 80 per cent. upward. The lymphocytes are of the large type. The nucleus stains deeply and nearly fills the cells with only a lesser outer ring of faintly staining protoplasm. The blood-platelets are decreased. The coagulation time of the blood is delayed.

There is one disease occurring in children that simulates closely the blood-picture found in acute lymphatic leukemia, that is, acute lymphadenitis in which the white count may be as high as 80,000, and in which 90 per cent. will be large lymphocytes. In this disease the patient recovers. The hemorrhages

found in leukemia are absent, but the high fever, lymphadenitis and enlargement of the spleen simulate leukemia.

Acute lymphadenitis should always be kept in mind and ruled out before giving the fatal prognosis that is warranted in acute lymphatic leukemia. The mistake in diagnosis has been made. The wrong prognosis, when given, is detrimental to one's reputation.

Treatment.—There is little to offer in treating these cases. *x*-Ray has been the latest therapeutic measure tried. In this clinic it has seemed to be of little or no value. Following the exposure to the *x*-ray the temperature rises higher and the patient seems to become more toxic. The fatal outcome has seemed to be precipitated sooner than if no treatment were instituted.

CLINIC OF DR. D. MURRAY COWIE

DIPHTHERIC PARALYSIS

DR. COWIE: As there are only a few moments left, I will not have time to consider the next case as fully as I should like to. There are a few points, however, that I may bring out which may be of interest.

This little girl, nine years old, came into the clinic a week ago complaining of inability to stand and walk normally. When I ask her to move her legs up and down she apparently does it in a fairly normal manner. On the other hand, when I ask her to get up, you see that she rises from her chair with some difficulty, and as she walks she does so imperfectly. She staggers, is infirm on her feet. Her knees are slightly unsteady. She comes to me and holds on to me because she has the fear of falling, and she would fall if she were allowed to stand very long. At one time her upper extremities were weak, and now, as you look at her, sitting in the chair, I think you will observe something peculiar about her face. Does anybody notice anything peculiar?

STUDENT: Her eyes do not look straight.

DR. COWIE: The external rectus muscle on the left side seems deficient and the eye turns inward. She has a diplopia. When you hold your finger before her eyes and ask her how many, she will say two. If you hold two fingers, she will say four.

What do you call this group of symptoms?

STUDENT: Paralysis.

DR. COWIE: What acute infectious diseases may induce symptoms of this kind?

STUDENT: Anterior poliomyelitis.

DR. COWIE: Does anybody think of another acute disease which so frequently produces this group of symptoms?

STUDENT: Diphtheria.

DR. COWIE: The history of the case is as follows: The child was taken ill five weeks ago, with a sore throat. The physician suspicioned diphtheria. A culture was taken and the following morning antitoxin was given. We are not quite clear as to how long the child had been ill before her physician saw her, but here is an illustration of prompt action on the part of the attending physician. At that time, or about that time, the child regurgitated through the nose. The history would lead us to believe the condition cleared up. She made a good recovery, went along about her play and school work until the fifth week after her infection, when the present symptoms developed. This, as you know, is characteristic of the late diphtheric paralysis, frequently called convalescence paralysis, as the nasal palsy noticed at first is characteristic of the early paralysis. It is interesting to note that she has a return, probably a continuance, of the nasal paralysis, for at the present time she frequently regurgitates through her nose.

These symptoms are all very familiar to you. I was particularly anxious to show you the case from the standpoint of the reaction of physician to patient, patient to physician, and physician to physician. The mother tells us that the first physician who diagnosed the case assured her everything was all right, not to worry, that the thing would take care of itself, and it was best to let the child put forth efforts of her own rather than to resort to any particular method of treatment, osteopathy, etc. As the child did not recover at once, pressure fom the neighbors and other members of the family made them dissatisfied with the first physician's advice, so they called a second physician. This physician immediately tells them, according to the mother's story, that the child was given too much antitoxin.

For you as young men, going out into the practice of medicine, I feel this is a very important lesson. In the first place, we have nothing but commendation for the first physician, except possibly he did not quite understand the psychology of the family. He had the knowledge within him of the usual course of a palsy of this kind. Maybe he did not say that it might be two or three months before all the paralyses would clear up. It may have

been that he was so busy, as physicians in the general practice so frequently are, that he did not have the time to sit down and explain the disease to the parents in a way that they understood. There is so much popular medicine floating about at the present time that it becomes necessary for physicians now not only to help people in understanding infectious processes, but to protect themselves by letting their patients appreciate that what they tell them is the truth. There are so many mistakes made in medicine by inferior physicians and surgeons that it is not at all surprising that the public should have some misgivings when a condition of this kind develops before their eyes. However, I think the latter situation might easily have been avoided had the first physician recognized the family psychology and been free to ask for consultation.

Of course those of us who know about diphtheria and the treatment of diphtheria with antitoxin could have nothing but condemnation for the attitude assumed by the second physician, providing the statement that the parent makes is correct. Antitoxin never produced a paralysis. There have been a few cases of tetanus and other infectious conditions reported due to the use of antitoxin, but these have not been due to the principle involved—giving antitoxin to combat toxin—but to contamination from some source. About the worst thing that a very large dose of antitoxin could do would be to produce a late or delayed serum sickness, which, as you all know, runs an uneventful course, the symptoms of which are very easily controlled, or, if given intravenously, a protein paroxysm.

The apparent rapid development of nasal palsy in this case might lead us to think that possibly the late palsy was due to an insufficient amount of antitoxin having been administered rather than too much. However, that is a criticism that cannot hold. Those of us who have had very much experience in the use of diphtheria toxin in the process of determining a minimum lethal dose are very familiar with the fact that a sublethal dose may have no immediate effect on the guinea-pig. The pig may continue to be active, and on the twenty-eighth or thirtieth day develop a palsy of the hind legs, from which it does not recover.

There is still a question whether this palsy can be prevented if, for example, antitoxin is administered several days after the injection of the toxin. The exact mechanism of the action of the toxin on the cells is not completely understood. We do know that cells are killed by the toxin the same as cells are killed by the infection of anterior poliomyelitis. If these cells are situated in important areas of the central nervous system or of the heart, serious damage, sooner or later, may follow.

I feel that had the first physician acquainted the patient with the possibility of paralysis developing later on, when he first saw the patient, that the parents would have been better prepared to accept his advice as to treatment. So I think it is our duty, when we have a case of an infectious disease, as, for example, measles, to tell the parents or the patient the danger that might develop from complications in the lungs, or a case of scarlet fever, the danger of nephritis, of middle-ear disease, and so on. I think it is our duty to our patients to acquaint them with these things, it is our duty to say to a scarlet fever patient, "There is danger of some kidney disturbance developing in the course of several weeks. Your urine should be examined every week for a few weeks until we are sure." To a diphtheria case, "If you develop any aches or disturbance in walking, etc., report it."

CLINIC NUMBER 2

CLINIC OF DR. D. MURRAY COWIE

GRANULOSIS RUBRA NASI. TUBERCULOSIS CUTIS

THE next case is that of a little boy four years old, who is brought to the hospital because of this red nose which has been present since infancy and because of his failure to gain weight. When you know his age you are particularly struck with the marked degree of undernutrition. He weighs only 18½ pounds as compared with the average weight for his age, 38 pounds. Tracing this underweight back to infancy we find that he weighed but 5 pounds at birth, between 8 and 9 pounds at the end of the first year, and from that time on his weight has very slowly increased to the present time. In other words, his present underweight is not due to recent illness. The parents have never been able to trace a cause for his failure to gain, the causes they would be likely observe, such as diarrhea, vomiting, refusing to eat, etc. When the mother's breasts failed, the third month, they changed from one food to another with the hope of finding something that would make him grow as other infants do. There are a few more points in the feeding history that may have a bearing on this undernutrition. He was kept on baby foods for two years, received no vegetables or cereals other than what may have been present in the baby foods until he was three years old. He has been given only a very few eggs, practically none since they discovered that his lips would swell if even a little of the egg touched his lips. He has never eaten meat.

We also find that in other ways his development was very slow. While he cut a tooth at the seventh month, he did not sit up until he was two years old; there was no creeping period; and he did not walk until he was two and a half years old. He did not talk until he was three years old.

There is a history of repeated attacks of boils during infancy; of an attack of pneumonia at nine months, and the mother tells us of fifteen or more convulsive attacks which were characterized by stiffening and jerking of the extremities and the entire body. These attacks, she says, would last as long as half an hour, during which he would frequently bite his tongue and

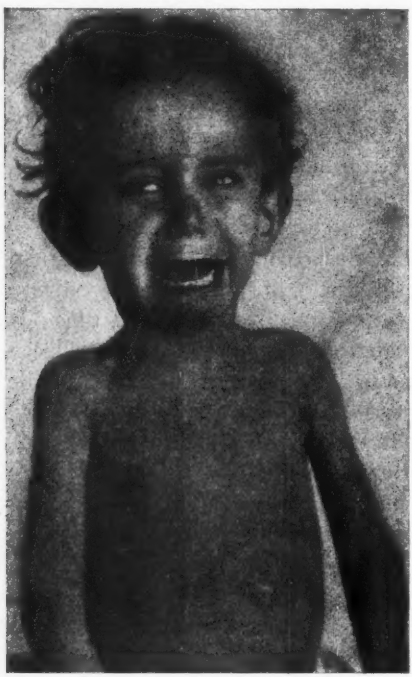


Fig. 174.—Granulosis rubra nasi.

pass urine and stool involuntarily. The mother seems sure that he has fever with these attacks. Recovered from measles four weeks ago.

The only history concerning the red nose is that it developed in early infancy and has persisted to the present time; it seems to be more in evidence when he has an illness of any kind.

He looks like a diminutive child. His face looks older than his years. The body, because of its scrawniness, its grayish, wrinkled, somewhat lifeless looking skin, in spite of being tiny, accentuates the idea of age. There is an eruption over the chest, arms, and abdomen, which, as you see, is characterized by very small dusky red papules. There is no weeping at any point.

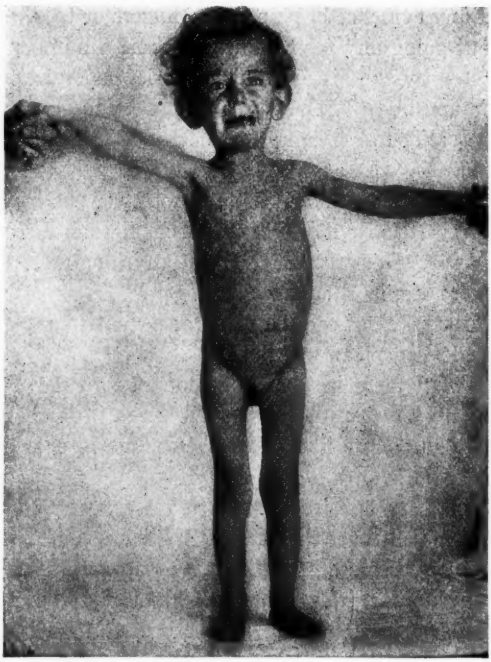


Fig. 175.—Granulosis rubra nasi.

There are very few eruptions over the face that could be called similar to those on the body. The eruption or process on the nose seems quite different. The entire nose is red. The redness is accentuated at the tip. As you examine it more closely you will find that there are many small papules which when pressed upon with a glass slide show minute yellowish-brown points.

These points are deep seated. The redness is not quite so marked today as it was yesterday, as the mother tells us it varies from day to day.

The hands and wrists are red, beginning at the tips of the fingers. This redness continues up to the middle of the forearm. There are no abrasions of the finger-tips. The patient does not put his fingers in his mouth, never has done so, nor does he seem to exhibit any evidence of pain in the fingers or toes.

Without going any farther into the case a number of things are suggested by the history and this brief general examination of the skin and body. What does the case suggest to you?

STUDENT: The nose condition looks like the acne rosacea of an old man.

DR. COWIE: How about the eruption over the body?

STUDENT: It looks more like a venenata than a true rash.

DR. COWIE: Does the case suggest anything more to you?

STUDENT: Lupus should be considered.

DR. COWIE: You say the eruption is not like a true rash. Just what do you mean by that?

STUDENT: I mean that it does not look to me like any of the rashes we have studied—measles, scarlet, or characteristic skin rashes—but more like an erythema due to some irritating substance.

DR. COWIE: When we examine it closely we find that it is distinctly confluent over the chest. There are some areas where the eruption is discrete and distinctly papular. This is more marked over the forearms. When I first saw the patient there was particularly no confluence to the eruption, such as we see in eczema. What is there about the case that makes you think of lupus?

STUDENT: Lupus vulgaris develops on the nose and is of long duration.

DR. COWIE: Does your idea of lupus make you desirous for any more information concerning the case?

STUDENT: Yes. I should like to know about the tuberculin test and the physical examination.

DR. COWIE: So far we have not been able to get a von

Pirquet reaction. Two have been negative. The physical examination, including the *x*-ray examination of the lungs, aside from the evidence of marked undernutrition, slight shotty adenopathy of the cervical and inguinals, and the somewhat distended abdomen which is due to a chronic digestive disturbance and not to involvement of any of the abdominal viscera or to fluid, is negative. The mother says he has never shed a tear, cries without tears.

The Wassermann is negative, the blood-count shows 3,900,000 red cells and 6100 white. The hemoglobin is 70 per cent. No differential count has been made. The urine is negative. *x*-Ray examination shows an enlarged thymus.

Why did you think of tuberculosis?

STUDENT: Because lupus is a tuberculous process.

DR. COWIE: Does the rash on the body suggest a tuberculous basis?

STUDENT: It does not look like tuberculosis to me. There are no lesions that look like tuberculids. No areas of discoloration.

DR. COWIE: The occurrence of an eruption like this, which I think we could not call eczematous and possibly not eczematoid, might easily be considered from the viewpoint of tuberculous cutis.

There must be someone in the class who can suggest some other condition we should consider in the differential diagnosis.

SEVERAL STUDENTS: Don't know.

STUDENT: Acrodynia.

DR. COWIE: What makes you think of acrodynia?

STUDENT: The way the eruption or redness involves the fingers and spreads up over the hands and arms.

DR. COWIE: Do you recall what I said about the eruption on these parts. Is there anything characteristic of the hands in acrodynia aside from the rash? What was the point brought out in the case of acrodynia you saw in a previous clinic?

STUDENT: There was marked parasthesia. The child wanted to put his fingers or toes in his father's mouth whenever he could. I forget whether you mentioned that point.

DR. COWIE: Yes. I purposely spoke of it in the beginning. I spoke of there being no abrasions of the skin or of the fingertips and that he does not put his fingers in his mouth or exhibit evidence of pain in the fingers or toes.

As I had not seen a case of this kind before and being impressed by its resemblance to tuberculosis cutis and because of the suggestion of acrodynia I had Dr. Wile look the patient over with us. He agreed with the idea of tuberculosis and made the diagnosis of granulosis rubra nasi. Dr. Wile considers the whole affair a Koch infection. A differential blood-count would be of assistance. It is quite possible to have a tuberculous process present and not be able to get a positive skin tuberculin reaction.

The mother offers information which seems to point to a sensitization to egg. Skin tests should be made. The child is very refractory.

Diagnosis.—Tuberculosis cutis. Granulosis rubra nasi. Chronic intestinal indigestion. Convulsions, epileptoid, functional. Enlarged thymus.

Final Note.—We were fortunate in getting a photograph, but not in keeping the child long enough to make further investigations. The case is recorded because of its rareness. The patient was returned to the referring physician, Dr. Wm. H. Gordon, with advice to force hygienic measures, absolute supervision of feeding in a hospital, control of the bad family psychology, care of skin condition from the standpoint of its being a tuberculous process.

A letter from Dr. Gordon, November 9, 1922, states that under hospital supervision there has been an absolute gain of 10 pounds in weight in seven months. The child looks very much better, but no change has occurred in the nose condition.

Dr. Greenthal will present the next cases.

CLINIC OF DR. ROY M. GREENTHAL

SYPHILIS OF THE CENTRAL NERVOUS SYSTEM IN CHILDREN. CASE REPORTS

In recent years the importance of spinal fluid examinations in patients with syphilis has been repeatedly emphasized. As a result of studies in this field we have been compelled to alter our conception of the frequency in which neurosyphilis occurs not only in adults but in children. At the present time we know that we will find abnormal spinal fluids in at least one-fourth of our patients with hereditary syphilis. We have found also that neurosyphilis should be considered in nearly every neurologic condition in childhood, as we may encounter the most varied syndromes. In this connection I wish to present 3 children who illustrate different types of central nervous system syphilis.

Case I.—B. B., aged four, was seen in the Pediatric Department of the University Hospital, February 2, 1922. She was brought to the clinic for examination because her father was being treated by the Department of Dermatology for syphilis. The parents have 5 children, the patient being the youngest. Since the birth of the patient the mother has had 2 miscarriages at seven months, both children being born dead. At fourteen months the patient was said to have had an attack of "infantile paralysis." This caused her to walk late (two years) and also interfered with the full use of her right arm and leg.

Examination.—The patient is a well-nourished and developed girl, who is not acutely ill. She appears to be mentally normal for her age.

Head.—The frontal bosses are unusually prominent. The hair is black and abundant.

Eyes.—The pupils are regular and equal in size. They react well to light and accommodation. Extra-ocular movements are normal.

Ears.—There is no discharge from either canal. The hearing is normal.

Nose.—No discharge.

Mouth.—All the teeth are badly decayed. The tongue and mucous membranes are normal. The throat is slightly inflamed. The tonsils are moderately enlarged.

Neck.—No rigidity or retraction.

Thorax.—No bony deformities are seen. The heart is not enlarged and no murmurs are heard. The lungs present no abnormalities; the breath sounds are heard clearly throughout both sides and no râles are heard.

Abdomen.—There is no distention. The spleen cannot be felt. The liver is palpable just below the costal margin.

Genitalia.—No abnormalities.

Extremities.—The left arm and leg are normal. There is a spastic paralysis of the right arm and leg. The patient has a typical hemiplegic gait. The right hand shows a contraction of the flexor muscles.

Glands.—There is a general adenitis involving the anterior and posterior cervical, axillary, inguinal, and epithrochlear groups.

Reflexes.—The knee-jerks and Achilles' jerks are exaggerated on the right side. There is no Babinski reflex. The biceps and triceps reflexes are also increased.

Skin.—No eruptions or scars.

Laboratory Reports.—Blood Wassermann + + + +. Urine negative for albumin, sugar, casts, and pus-cells. White blood-cells 12,800.

Spinal fluid, pressure somewhat increased. There is a slight opalesence. Cells 56 per cubic millimeter, globulin 20, albumin 10. Wassermann spinal fluid + + + +.

Colloidal gold, 0001110000 (meningitic).

Mastic, 2221100.

Diagnosis.—1. Hereditary syphilis. 2. C. N. S. syphilis. 3. Right-sided hemiplegia.

Case II. T. M., aged eight, was brought to the Pediatric

Department by a state agent December 8, 1920. Only very meager details as to his history could be obtained. His father and mother are said to be living and well. He has a brother and sister both older than he, who are also said to be well. He is brought to the hospital because of a right-sided paralysis, mental deficiency, and convulsions, all of which conditions are said to have been present since birth.

Examination.—The patient is a well-nourished and developed boy not acutely ill. His mentality is roughly that of a two-year-old child. During the course of the examination he had an epileptiform convulsion lasting about five minutes. He frothed at the mouth and the convulsive movements were mainly confined to the left side. There was no incontinence of urine or feces. He did not seem drowsy or sleep after the convulsion was over.

Head.—The frontal bosses are prominent. The hair is red and abundant. There are no exostoses or tender areas.

Eyes.—The right pupil is slightly larger than the left. Both pupils are somewhat irregular, but react promptly to light and accommodation. The corneæ are clear. The extra-ocular movements are normal. There is no nystagmus.

Nose.—There is a purulent nasal discharge. No bony deformities are present.

Ears.—There is no discharge from either canal.

Mouth.—The right corner of the mouth is lower than the left. The right cheek sags lower than the left. There is a paralysis of the right facial nerve, affecting the lower segments only. The teeth are badly decayed and many are missing. The tongue and mucous membranes are clear. The tonsils are slightly enlarged. The breath has a foul odor.

Neck.—There is no rigidity or retraction. The thyroid is not enlarged.

Thorax.—There is no asymmetry. The heart is not enlarged and there are no murmurs. The lungs are clear throughout.

Abdomen.—There is a slight distention. The spleen cannot be felt. The liver is palpable 4 cm. below the costal margin in the right nipple line.

Genitalia.—There are no abnormalities.

Extremities.—There is a spastic paralysis of the right arm and leg with contracture of the right forearm. When patient walks he holds the right leg stiffly and scrapes his toe. The right elbow and wrist are held in a position of flexion. There is considerable weakness of both the right arm and leg. The left upper and lower extremities are normal.

Reflexes.—The triceps, biceps, patellar, and Achilles' reflexes are markedly accentuated. There is a positive Babinski reflex on the right side, also a positive Oppenheim and Gordon reflex. The reflexes on the left side are normal.

Glands.—The left epitrochlear is palpable, otherwise the glands are not unusually enlarged.

Skin.—There are no eruptions or scars.

Laboratory Reports.—Urine negative for albumin, sugar, pus, and casts. Blood Wassermann ++++.

Spinal Fluid: The pressure is somewhat increased. The fluid is not quite clear. Cells 348 per cubic millimeter, globulin 40, albumin 30. Spinal fluid Wassermann ++++

Colloidal gold curve, 55433311000 (paretic).

Mastic curve, 444430.

Diagnosis.—1. Hereditary syphilis. 2. C. N. S. Syphilis. 3. Right-sided hemiplegia with right facial paralysis. 4. Epileptiform convulsions. 5. Imbecility.

Case III.—H. T., aged eleven, was brought to the Pediatric Department on February 4, 1921, by a state agent because of blindness. There was no history obtainable except that the child's parents were unknown and that he had had increasing difficulty in vision for the last six years.

Examination.—The patient is a male child not acutely ill, well developed and nourished. His mentality seems normal.

Head.—There is no asymmetry. The hair is black and abundant. The scalp is clean.

Eyes.—The patient can only distinguish light from darkness. There is no haziness of the cornea on either side. There is a moderate conjunctivitis on the right side. The pupils are equal, but react sluggishly to light.

Fundus examination (Dr. W. R. Parker): O. V. optic atrophy; disseminated choroiditis; luetic peripheral choroiditis, congenital type.

Ears.—The drums are normal. Hearing appears to be normal.

Nose.—There is no discharge or bony deformity.

Mouth.—The teeth are markedly carious, several have erosions at the side. The tongue and mucous membranes are clean. The tonsils are not enlarged or inflamed.

Neck.—There is no rigidity or retraction. The thyroid is not enlarged.

Thorax.—There are no bony changes. The heart apex is just to the left of the nipple line in the fifth intercostal space. The sounds are clear and distinct and there are no murmurs. The lungs expand equally throughout both sides. The breath sounds are normal. No râles are heard.

Abdomen.—There is no distention. There are no masses or herniæ. No enlargement of the superficial veins. Neither the liver nor the spleen are palpable.

Genitalia.—Negative.

Extremities.—There is no atrophy, spasticity, or deformity of either extremity. The tibiæ are smooth.

Reflexes.—The reflexes are all present and neither increased nor decreased.

Glands.—The inguinal and axillary glands are larger than normal. The epitrochlears are not palpable.

Skin.—There are no eruptions or scars.

Laboratory Reports.—Urine negative for albumin, sugar, and casts. Blood Wassermann ++++.

Spinal fluid, clear and not undue increased pressure, cell count 46 per cubic millimeter, globulin 10, albumin 10, sugar 10. Spinal fluid Wassermann ++++.

Diagnosis.—1. Hereditary syphilis. 2. C. N. S. Syphilis. 3. Optic atrophy. 4. Disseminated choroiditis.

Comment.—These 3 children illustrate nicely some of the varied pictures which are found in hereditary neurosyphilis. In each patient not only the blood but spinal fluid Wassermann was strongly positive. The patients were given intensive antiluetic

treatment without much improvement in their neurologic conditions. The outcome in children is practically the same as in adults with neurosyphilis. The extensive injury to the nervous tissue caused by the syphilitic toxins cannot be easily repaired. It is possible that had the diagnosis been made early in life and proper treatment been given, the outlook would have been more favorable. At any rate, we should realize the importance of recognizing an involvement of the central nervous system in hereditary syphilis.

The next case will be presented by Dr. Brown.

CLINIC OF DR. GEORGE M. BROWN

REPORT OF A CASE OF MADELUNG'S DEFORMITIES[1]

MADELUNG'S deformity is a rare condition. It was first clearly described by Madelung at the seventh German Surgical Congress in 1878. The disease seems to be an idiopathic, progressive curvature of the radius, resulting in a silver-fork deformity. Sometimes the process involves the tibia, causing a bowing, as it has in this case. Stetten[2] reviewed the literature very completely in 1909 and reported the first case in this country. Stokes[3] added 2 more cases in 1910. In their search through the literature they found about 60 cases previously described. This case, so far as we are able to determine, is the fourth one reported in America. It is unique because of the age of the patient (eight years) when the deformities began, and it is the first case, I believe, to be studied by laboratory methods other than *x*-ray.

History.—Barbara W., aged eleven years, entered University Hospital, December 8, 1920, because of deformities of wrists and legs. Reviewing the family history we find that no one in the maternal or paternal ancestry has ever had similar deformities. The father and mother are living and well. There are 8 other children living and well, none dead, no miscarriages.

Birth History.—Fourth child in the family, normal birth after an eight months' pregnancy. The birth weight was 2½ pounds. The mother had a bloody discharge for three days when pregnant three months with this child with no untoward result.

Feeding History.—Breast fed fifteen months. She nursed well, grew rapidly, and developed no nutritional disturbances. No evidences of rickets.

[1] From the Department of Pediatrics and Infectious Diseases, University of Michigan Medical School, Ann Arbor, Dr. D. M. Cowie, Director.

[2] Stetten: Journal of Surgery, Gynecology, and Obstetrics, p. 4, vol. 8, 1909.

[3] Stokes: Annals of Surgery, p. 229, vol. 52, 1910.

Past History.—She had an umbilical hernia when six weeks old. A truss was worn until she was two years old, when it was no longer needed. She has had chickenpox, whooping-cough,

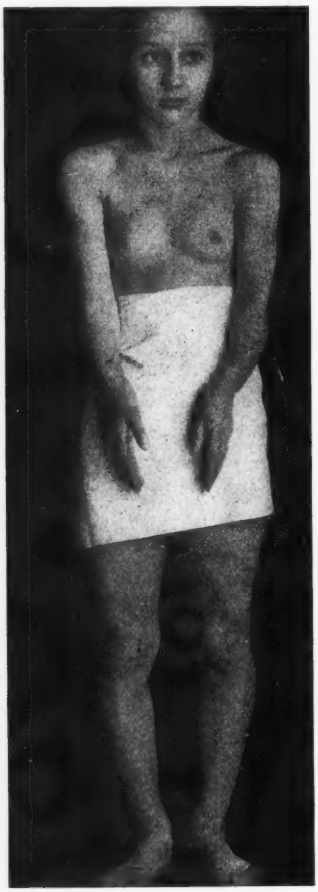


Fig. 176.—Showing the deformities of the upper and lower extremities.

scarlet fever, and influenza. Good recoveries. Her skin has always been moist, and her hair much more oily than the other children in the family.

Present Trouble.—The present trouble was first noticed when she was eight years old, her left wrist becoming deformed. Two months after this the right one also showed evidence of involvement. The lower ends of the radius and ulna on both sides became prominent posteriorly and overrode the carpal bones. The deformities progressed steadily from the time of onset, but more rapidly during the last few months. About one year after the changes in the wrists started the legs began bowing. The accompanying illustration (Fig. 176) shows the extent of the deformities to the present time.

Physical Examination.—Patient is a well-developed, well-nourished child of normal weight and height for her age. Aside from the deformity of arms and legs, the physical examination is entirely negative. The cranial bosses are not prominent. There is no rachitic rosary, no Harrison's groove, and the spine is straight. The epiphyses are not broader than normal, nor does the *x*-ray show any signs of rickets. The arms show a bowing of both radii with convexity posterior. The wrists are apparently displaced forward, giving characteristic bilateral silver-fork deformities. There is no broadening at the epiphyses, no tenderness or inflammation. There is good strength in the fingers and perfect action of all the joints of the hands. There is a lateral bowing of both tibiæ with the greatest convexity near the proximal ends. There is no broadening of the lower epiphyses. There is no limitation of motion in the knee- or ankle-joints. There is perfect action of all muscles in the legs.

Patient was referred to Dr. L. C. Abbott, of the Department of Orthopedics, who made the diagnosis of Madelung's deformities and advised observation.

Patient was also referred to the Department of Roentgenology and report made by Doctor J. G. Van Zwalewenburg is as follows:

"The hands show a curious and characteritsic deformity with a shortening of both ulna and radius and absence of the center of ossification for the head of the radius. The lower articular portions, both of the radius and ulna, are wedge-shaped, with a posterior dislocation. The carpal bones of the hands

have been somewhat modified by the abnormal position, but otherwise do not partake of the fundamental deformity.

"The lateral stereo of the feet shows what appears to be a fairly well-marked flat-foot, but the lower ends of the leg bones apparently do not partake of the deformity of the arms. The feet are otherwise negative.

"The knees show a rather curious bowing, the deformity being most marked in the tibia, and that of the femur being

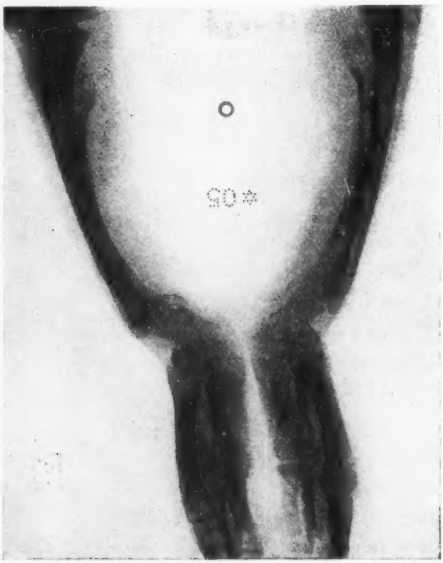


Fig. 177.—Radiograph of forearms, wrists, and hands.

largely compensatory. In the latter case it is somewhat asymmetric, being more marked on the right than on the left. There is no distinct anomaly of texture or density and the plates are otherwise negative.

"Diagnosis: Anomaly of the forearm and of the knee, Madelung's deformities."

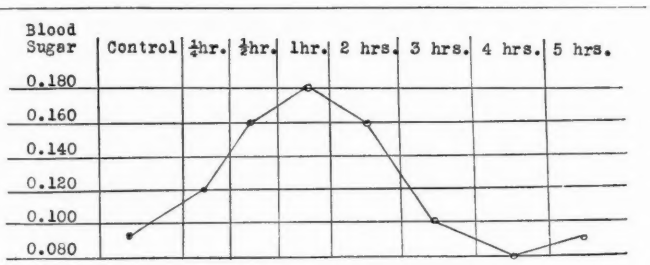
Wassermann reaction negative. Urine examination negative.

The patient was next seen four months later. The deform-

ities had increased slightly, still she was suffering no inconvenience from them.

She was admitted to the hospital for observation at this time and the following laboratory studies were made:

1. Blood calcium content (Lyman), 0.060 gram per 100 c.c.
2. Blood urea nitrogen (Marshall?), 0.015 gram per 100 c.c.
3. Total non-protein nitrogen (Folin and Wu), 0.028 gram 100 c.c.
4. Blood fat (Bloor), 0.725 gram per 100 c.c.
5. Blood sugar (Folin and Wu), 0.090 gram per 100 c.c.
6. Plasma carbon dioxid capacity (Van Slyke) 55.7 volume per cent.



Glucose Tolerance Curve

Fig. 178.

7. Glucose tolerance test made by feeding patient on fasting stomach 1.75 grams of glucose per kilo of body weight, and determining the blood-sugar content immediately before the ingestion of glucose and at stated intervals following. The results are shown in the accompanying curve (Fig. 178).

Routine blood examination, including differential count and hemoglobin estimation, was negative.

The stool showed no undigested food material visible to naked eye, and contained neither fresh nor occult blood.

Being unable to discover any abnormality in the laboratory findings of this patient, she was provided with braces for her legs and allowed to go home.

She has worn the braces until the present time (November,

1922), but the deformity of the legs has gradually increased. The left arm is now worse than the right, but she can still use her hands to good advantage and suffers no pain.

The **etiology** of this disease is not clearly understood. It may have a congenital background or it may be a disease of adolescence in the secondary growth period. It occurs seven times more frequently in females than in males. The idea that it may result from trauma, overwork, or unhygienic living conditions cannot be substantiated in this case.

Pathology.—The epiphyseal ends of the bones are irregular, excurvated, and not completely developed. The ends of the bones are not so large as normal and are turned so that the processes will not hold the carpal bones in place on the volar side. The same is true of both ulna and radius. The cartilages between the carpal bones and the epiphyseal cartilages are imperfect, ossified in places, irregular in thickness, and wanting in other points. It is not so much a dislocation as a deviation in direction due to the change in the curve of the radius.

Prognosis and Treatment.—The prognosis is good as to life. The patient may complain of some pain for years upon exercise of the wrists. Ultimately the symptoms will disappear and the resultant process will be a deformity of the wrist-joints known as the silver-fork deformity. Not all patients show changes in the tibiæ.

Palliative treatment is indicated up to the age of twenty-five, when practically all symptomatology disappears. Ordinary plaster casts, splints, etc., are useless. Sometimes osteotomy may be justifiable when the deformity is very great, yet it is not indicated except for cosmetic effects, and then it is questionable in its results.

Conclusion.—We have here presented a case of Madelung's deformities with rather complete laboratory studies. Blood, urine, and stool showed no change from the normal.

CLINIC NUMBER 3

CLINIC OF DR. JOHN P. PARSONS

ENLARGED THYMUS—CLINICAL FINDINGS IN A SERIES OF CASES

THE group of cases I wish to present will deal with thymic conditions. This condition is by no means rare and frequently enters into the cause of death in various types of infections and surgical procedures. Some of our colleagues, on the other hand, think it is a very rare condition, and that no general routine measure need be taken to rule out these cases. Personally, I feel sure that if some routine measure could be established to rule out these cases the death-rate in pneumonia and other severe infections would be materially reduced, especially among babies and children.

The thymus glands may take any one of three positions, namely, cervical, cervicothoracic, and thoracic. Probably the most common location is around the large vessels at the base of the heart, that is, the thoracic position. When in this position it is never fixed, since it will vary with each inspiration and expiration and to some extent with diastole and systole of the heart. On *x*-raying the normal chest we find a shadow just beneath the sternum in the upper part of the chest which is interpreted as the great vessels and mediastinal glands. Ordinarily this is not much wider than the sternum. When this shadow is wider the bronchial glands, an enlarged thymus, or some anomaly of the great vessels must be considered. Now suppose you have a long, narrow, thick thymus which is entirely thoracic in position. It is perfectly obvious that any anterior or posterior view would not give an unusually wide shadow on the plate. The *x*-ray report probably would be negative. Yet that case has an unusual amount of glandular material and should be

considered an enlarged thymus. *x*-Ray men, no doubt, have had such cases in mind, for often the patient is *x*-rayed in the lateral position which would be more likely to show such a thymus. This technic, however, has not been entirely satisfactory.

As another hypothetic case let us imagine the thymus no wider than the sternum, but long and thick. A flat plate of such a case, as I said before, would probably show a negative thymus. Now imagine an *x*-ray taken when the heart is in diastole or flattened out and the diaphragm is relaxed and down, namely, at the end of expiration. It surely must be obvious to you all that there is a tendency to a lengthening out of the great vessels and mediastinal tissues. This picture would probably show a narrow or negative thymus. Should a picture, however, be caught when the heart is in systole, contracted and upright, and when the diaphragm is contracted and up, corresponding to the end of inspiration, it must naturally occur to you all that the heart is pushed up and the mediastinal tissues above are pushed together, tending to broaden the shadows of the great vessels of the neck or what lies in front of them. This same effect can, of course, be produced by a distended abdomen, due to a number of causes. Furthermore, when the parts assume the latter position the thymus is thrown nearer the chest wall, and this might very easily effect the size of the thymus shadow.

Reasoning from this viewpoint, we see that an *x*-ray picture of the chest may not always be conclusive in ruling out an enlarged thymus. I feel sure, after the following cases have been presented, you will be convinced that the *x*-ray, although a very valuable aid in making a diagnosis, is not infallible, even though every precaution has been taken with regard to the points in the technic I have mentioned.

Case I.—L. F., aged four months, female. First seen in our Welfare Clinic, June, 1922. The chief complaint at this time was that the baby choked easily. At first the mother noticed that this generally occurred while nursing, but recently the baby would wake up out of a sound sleep with a peculiar choking spell. This baby had never had any serious illness, but during the past

winter has had frequent colds to the extent that it has been almost a continuous affair. The mother says the baby is very susceptible to colds and bronchitis. On examination we found an infant who looked perfectly healthy, perhaps slightly overweight. The neck was rather short. The panniculus was thick, particularly around the shoulder and hip girdles. The tonsils and adenoids were moderately enlarged. The cervical and axillary glands were not unusual. The liver and spleen were not palpable. The musculature was flabby and the color sallow. The baby had no temperature at this time, no evidence of a cold. Percussion of the thymus was negative. Examination was otherwise negative.

In making a diagnosis from data presented by this case one should always think of a spasmodic croup, which usually comes on at night, but is generally relieved by cold compresses, steam, or codein. One should also think of asthma, as many children never have asthma until night. Of course they may have spells that simulate choking, during which they actually become cyanotic. On auscultation, however, these cases will present a typical asthmatic chest. On the other hand, an enlarged thymus is frequently the cause of asthma. Accordingly, the first line of procedure to follow is to have a radiograph of the chest made. We did this.

The patient was immediately referred to the Pediatric Outpatient Department for *x*-ray. The plate showed an enlarged thymus. Following this the patient was referred for *x*-ray therapy, and treatments were given once a week for four successive weeks. Improvement was noticed after the first treatment. After three treatments all choking spells had disappeared. The patient was *x*-rayed again in three months. Comparison with the original plates showed the thymus very much reduced in size. Two months later this patient went through an attack of pneumonia without any difficulty.

Case II.—E. M., aged four and a half months. This patient was seen for the first time June, 1922, at the Welfare Clinic. He was followed in the Welfare Clinic from shortly after birth

as a feeding case. Throughout this period the mother had made no definite complaints; in fact, she stated that the baby was coming along very nicely. At these frequent early visits the mother was asked several times regarding local symptoms that might be attributed to the thymus. Her replies were always negative. When the baby was four and a half months old he was brought to the clinic because of croup, which had occurred every night for the past two weeks. Cold compresses and steam had little or no effect. Codein had not been tried. This child has had repeated "colds." On examination he appeared to be perfectly healthy, color fairly good, musculature somewhat flabby. The general build of the patient suggested the thymic type—short neck, fatty girdles, etc. The tonsils were only moderately enlarged. Percussion over the thymic area suggested slight increased dulness to the left of the sternum.

The mother was instructed to use cold compresses, and was given a prescription containing codein. These measures, however, gave no relief. The next day an *x*-ray was done and an enlarged thymus found. The patient was given four *x*-ray treatments at weekly intervals. He repsonded very well, but not much improvement was noted until after the second treatment. Six weeks after the last treatment the patient was re-*x*-rayed. The plate still showed a definitely enlarged thymus. However, there was marked reduction over the previous plate. No attacks of croup have occurred since the second treatment.

This case illustrates an enlarged thymus which gives little or no trouble until after repeated infections.

Case III.—D. H., female, aged six months, was observed in the Welfare Clinic weekly from shortly after birth until the sixth month. When I first saw this baby she impressed me as being of the thymic type; at least it was suggested by her general build. In other words, she was a very short, chubby baby, with a very short neck. On questioning the mother we find that she had never had any choking spells, attacks of cyanosis, difficult breathing, or asthma, and so far has been perfectly well. When six months old the patient was brought in because of a severe

cold. Three or four weeks after she apparently was taken with a similar cold. The mother was not alarmed about this cold, but felt that she wanted to get an early start on the treatment with the hope of shortening the attack.

Examination.—Short, chubby, well-nourished baby, apparently healthy except for an acute cold. Cheeks flushed, probably due to temperature. Musculature was somewhat flabby. The tonsils and adenoids were definitely enlarged, but the cervical, axillary, and inguinal glands were not remarkable. The throat was red. There was also a marked rhinitis associated with a temperature of 102° F. It was also observed on this visit that the baby had more or less difficulty in breathing at times and that a slight excess of mucus choked her easily. At this time the mother was again questioned for evidence of local symptoms of thymus disturbance. None was obtained. The patient was discharged from the clinic with a prescription for 1/8 grain of codein, to be given every three hours to control the cough. She was further instructed to have the doctor observe the patient from day to day. On the following day she was very much worse; temperature 103° F. There was a definite dyspnea associated with a marked cough. Two or three times during the night there was a marked choking spell, associated with cyanosis. Rhinitis was very marked and the baby appeared somewhat toxic. The respirations were 36. The color was good except during an attack of severe coughing. The case at this time was treated from the viewpoint of a central pneumonia, although auscultatory examination was negative. On the following day she seemed to be in a very serious condition, and the mother thought the baby was dying. The temperature at this time was 104.5° F. by rectum. The baby looked toxic and exhausted, seemed too weak to cough. The respirations became very rapid at times; at other times they would drop to 25 per minute. There was more or less continually a tendency to choke. Auscultatory examination of lungs was negative. I watched the baby for forty-five minutes. During this period she had three very severe choking attacks, associated with cough and cyanosis, and as time went on the choking became almost continuous. There

was a slight tendency toward stridor. I then decided that the baby did not have pneumonia, but rather a severe influenza, associated with thymus enlargement. Perhaps an acute thymus condition, if that is possible. The baby was, therefore, brought into the University Hospital as an emergency case, and was given *x*-ray treatment immediately. A radiograph was not taken until the following day. This plate showed an unusually enlarged thymus. Definite improvement was noticed eight hours after the treatment. The next day the baby was very much better. The *x*-ray showed no evidence of pneumonia or of any pathology in the chest aside from the enlarged thymus. After four days a second thymus treatment was given, and the patient was then sent home with orders to return once a week for an *x*-ray treatment. The patient continued to improve and has been followed now for six more months. There has been no return of thymic symptoms. Another interesting point is that she has been free from colds so far this winter.

In this case it probably would have been useless to have continued treating the infection without giving direct attention to the thymus.

Case IV.—E. E., male infant, aged five months. This patient was first seen in the Welfare Clinic two weeks after birth. He was observed at weekly intervals for several months as a feeding case. On examination this child appeared perfectly healthy. He showed some characters of the thymic habit. These, however, were not marked. His color was good. His muscles and other tissues showed normal tone. The adenoids and tonsils were not remarkable. The cervical and axillary glands were little if any enlarged. There was no history of local symptoms of thymus obtainable. Percussion of the thymus was negative. Further examination was negative.

When this patient was about four and a half months old he was taken ill with what the mother thought was an ordinary cold, as manifested by cough and coryza. The cough gradually became worse, and finally there developed with it a distinct stridor and a definite whoop. At this time a physician was called. He

immediately made a diagnosis of whooping-cough. The case was treated as one of whooping-cough for the next eight days. The patient got progressively worse. The stridor became more marked. It could be heard throughout the house. Cyanosis was also marked. I first saw the patient at this time. The baby made a sound that might easily be mistaken for a whoop unless carefully analyzed. The characteristic point of difference was that the baby choked from the very beginning of almost every coughing paroxysm, and it seemed that the cough was instituted by a choke instead of being followed by a whoop, as it is in pertussis. The cough was not the striking feature. It was the repeated choking. Examination of the chest showed each inspiration to be associated with marked retraction of the ensiform and rib margin and of the space just above the manubrium. This group of symptoms suggested the possibility of a foreign body, although the other group of symptoms strongly suggested an enlarged thymus. The patient was immediately brought into the hospital as an emergency case and given an *x*-ray treatment. The radiograph made immediately after showed a very large thymus. His thymus was treated once a week for four weeks. Definite improvement was shown after the first treatment. The baby has been well ever since. There has been no tendency to recurrence of symptoms.

It is my belief that this patient had an enlarged thymus that produced no disturbance until he developed a severe infection. It is very much like the previous case.

Case V.—H. H., an infant girl, aged six months. The patient entered the Welfare Clinic four weeks after birth on account of vomiting. At this time a diagnosis of pyloric spasm was made. She was given atropin after the usual manner, kept on the breast, and the mother instructed to avoid unnecessary handling. The patient did very well from the start and gained steadily. She was seen at weekly intervals as a feeding case until she was several months old. Nothing unusual was noted during this period. No symptoms developed that suggested thymus involvement. Her general build is the opposite of what is often

referred to as the thymic habit. In other words, she is a long, thin individual, with a long neck. Her tonsils were definitely enlarged. Examination revealed a mass of adenoids. The glands were negative. When winter came she had frequent colds, one following the other in rather quick succession. One of these infections was a severe follicular tonsillitis with a temperature of 104° to 105° F. The glands in the neck were definitely enlarged, some of them the size of filberts. Recovery took place without any untoward complications. At no time during this illness did she manifest thymic symptoms. Soon after the recovery from the last infection she developed a severe cough which came on in paroxysms. I saw her during this illness. Examination showed a long thin body, long neck, cheeks flushed, lips cherry red, temperature of 103° F. Examination of the lungs was negative. Thymus percussion negative. The throat was red and there was slight enlargement of the cervical glands. She manifested no clinical evidence of whooping-cough. The mother, however, was very certain that her baby had whooping-cough. A leukocyte count showed 13,000 whites, of which 45 per cent. were polymorphonuclears, 25 per cent. small lymphocytes, 20 per cent. large lymphocytes. This count would not support the idea of whooping-cough, particularly since the blood was taken during a paroxysm. To me the paroxysms were quite different from those of whooping-cough, in that they were characterized by choking and cyanosis. The frequent succession of coughing was not observed and the cough itself was not marked. Our first opinion was that we were dealing with an enlarged thymus. The possibility of foreign body was considered. An *x*-ray treatment was given as soon as we could get her to the hospital and a plate taken after the treatment. The plate showed a very much enlarged thymus. Treatments were given every week for four successive weeks. Definite improvement was observed after the first treatment. There has been no further trouble.

This is another example of a patient with an enlarged thymus, showing no thymic symptoms or discomfort until after repeated infections had occurred.

Case VI.—The next case I wish to present is an infant, R. G., female, five months old. This baby had been observed weekly from birth. At this time she entered as a feeding case. General examination was negative. I was impressed with her unusually short and chubby body and her very short neck. The patient continued her weekly visits to the clinic, at which time I tried to elicit from the mother evidence of local symptoms of thymus. The mother made the observation that the baby would have difficulty in swallowing at times and would choke very easily, but would never wake out of a sound sleep with a choking spell. These attacks only occurred during the nursing period. An *x*-ray of the chest was advised. The parents refused to have it done. As winter approached the baby gave more evidence of trouble, and had several colds, during which she would choke during nursing. At the last infection she apparently relapsed and a very severe bronchitis ensued. This illness was characterized by high temperature, paroxysms of coughing, choking, and attacks of cyanosis. The illness became so serious that a grave prognosis was given. Immediately following her illness I saw her again and urged an *x*-ray examination before she had another cold. This was granted. A very much enlarged thymus was found. Three treatments have brought about definite improvement in the clinical symptoms and difficulty in swallowing. The thymus shadow has been reduced.

This is another illustration of an enlarged thymus which caused very little trouble until after a serious infection. I think the severe illness could have been very much shortened by *x*-ray treatment at the time, or entirely prevented had our previous advice been followed.

Case VII.—This patient, E. J., a girl aged five years, entered the clinic because of asthma. The family history is negative. The patient has had "flu," measles, and chickenpox. No other illnesses except frequent colds and attacks of bronchitis.

Present History.—Asthma first noticed four and a half years ago, when the patient was six months old. It comes on regardless of season, occurring about every two or three weeks and lasting

several days at a time. During these attacks the patient is unable to lie down because of the dyspnea. The wheezing can be heard across the room. Whenever the patient has a cold the attacks are very much worse. She is very susceptible to colds. During the winter months they may be continuous. No history of food poisoning.

Examination showed a tall, slender child, long neck; the opposite of the thymic build. She was anemic, sallow, and had flabby muscles. Tonsils and adenoids removed. Cervical glands slightly enlarged. Percussion of the thymus seemed to show slight increase in dulness to the right, no dulness to the left. Physical examination otherwise negative. *x*-Ray of the chest showed a very enlarged thymus. The patient was given an *x*-ray treatment once a week for four successive weeks. Definite improvement was noted from the first treatment, as evidenced by freedom from asthma. It is now six months since she has had an attack. Before this time she was never free longer than two weeks at a time. After six weeks a second radiograph was made. The gland was still enlarged, but very much reduced. The patient was given three more treatments.

This case again shows that an enlarged thymus is not always associated with a short neck or fatty girdles. It brings out an important point—that the thymus may be the cause of asthma.

Case VIII.—The next case I wish to present is an infant, E. R., male, aged three and a half months. He entered the hospital because of a harelip and cleft palate. At the time of entrance he had a cough, but this complaint was not made by the parent. The child had never been sick. On examination we found a harelip and cleft palate. General build did not suggest the thymolymphatic type. He was a rather long, thin baby, long neck, fatty girdles not increased. Examination of the heart and lungs was negative. The tonsils were moderately enlarged. The glands were negative. Examination was otherwise negative.

During the stay in the hospital the baby's cough became worse and was very difficult to control. Finally he developed definite paroxysms, associated with choking. Whooping-cough

was considered, but was immediately ruled out by the leukocyte count and the blood-picture. The white count was 9000, polynuclears 48 per cent., large lymphocytes 20 per cent., small lymphocytes 25 per cent., eosinophils 2 per cent., mononuclears and transitionals 5 per cent. *x*-Ray of the chest was reported negative. The thymus was not considered enlarged. The child was closely observed for the next two days. The attacks became very much worse. Codein seemed to have no effect and cold compresses were of little benefit. Our previous experience led us to treat this case as a thymus case, in spite of the fact that the *x*-ray was negative. The first treatment gave immediate relief, which was noticed in from eight to twelve hours after treatment. The second treatment removed all difficulty.

This case possibly illustrates that type of thymus which is long and narrow, but thick, and difficult to show with the *x*-ray. Of course we must keep in mind that the patient's difficulty could also be explained by bronchial tracheal glands. The treatment would be beneficial in either case.

The next 2 cases I wish to present are very much older children. They will serve to bring out another point in the thymo-lymphatic picture. This patient, H. D., female, aged seven years, entered the hospital for tonsillectomy. Shortly after entrance she developed diphtheria and was transferred to the contagious hospital. She had had a sore throat for several days. She was not, however, extremely sick, and did not have the severe aches and pains often referred to in tonsillitis. She had never had diphtheria. On examination the patient did not look very sick or very toxic. She was a long, thin individual with a long neck. Examination of the throat revealed a very extensive diphtheric membrane over the tonsils. The lungs were negative. Heart was negative except that it was rapid. She responded to all questions asked. Her mind seemed to be clear. She was given a large dose of antitoxin because we felt the case had been running several days. We did not, however, think she was beyond help or would die as a result of the diphtheria. She impressed us as having a moderately severe infection, but nothing unusual. She was given 40,000 units of antitoxin intravenously

and 20,000 units intramuscularly. The patient reacted at first, as is the custom after intravenous antitoxin, with marked chill, followed by a high temperature. The temperature began to rise about one hour after the injection. At this point she manifested very unusual symptoms. She seemed to have more difficulty in breathing, became very restless, rolled and tossed about, and finally wanted to fight. This condition became progressively worse. Her breathing became labored and she became cyanotic. After an hour large bubbling râles could be heard throughout the chest. She finally lapsed into coma. The respirations became still more difficult, the chest seemed to fill with fluid, and shortly the patient stiffened out and died in convulsions.

When we consider the cause of death in this patient, the first thing that would enter your mind probably would be anaphylaxis. This patient, however, did not respond to adrenalin or atropin. Furthermore, the reaction was not a sudden affair, but came on gradually and the patient was two and a half hours dying. This, in my opinion, is not characteristic of an anaphylactic death. Death from anaphylaxis after diphtheria antitoxin is rare in spite of the fact that the reaction itself may be extremely severe. Should it occur, it would be very sudden. We might next think of toxemia as the cause of death, but recall that this patient was not very toxic. She responded to all questions, was aware of everything that was going on about her, and showed no evidence of stupor. There is probably no doubt that she manifested some symptoms of toxemia, but certainly nothing unusual or to a degree that we would consider dangerous in itself.

There was not sufficient evidence to explain death. Some would naturally lay it to antitoxin *per se*. Autopsy was refused, but Dr. Cowie refused to sign death certificate without it. Autopsy revealed a very much enlarged thymus. The thymus was not very broad, but was very long and thick. Those who viewed the autopsy were convinced that death was due to an enlarged thymus.

The point that I want to bring out in this case is that thymic death is not necessarily rapid or sudden. Sudden death probably only applied to cases in which the thymus was an extreme condition at the time. As you recall, in looking over these cases,

it took several repeated infections, several assaults on the body before the thymic symptoms manifested themselves. Therefore, we can see that this whole process could be a graded affair. This patient had an enlarged thymus, which undoubtedly had stood the test of numerous assaults before, but at this time the severe protein reaction, following the injection of antitoxin, was too great a strain.

The next case I wish to present was also a case of diphtheria, R. L., a boy aged two and a half years. I saw this patient on what I thought was the third day of the disease. There was a definite diphtheric membrane covering both tonsils and extension to other adjacent parts. The child did not look very sick and did not act sick. In my opinion there was practically no evidence, at least clinically, of any marked toxemia. He previously had been operated upon several times for a papilloma of the larynx and also had had a tracheotomy performed. His general build did suggest the thymolymphatic type. He had markedly enlarged tonsils and definite enlargement of the cervical glands. Axillary and inguinal glands, however, were negative. The muscle tone was poor. The color was somewhat pasty. He was admitted to contagious hospital as a light case of diphtheria and was given the routine treatment of 20,000 units of antitoxin intravenously, 20,000 intramuscularly. Forty minutes after the injection the child developed very difficult breathing, choking, and cyanosis. Fifteen minims of adrenalin were given, with slight relief. Fifteen minutes later general epileptiform convulsions occurred, when breathing would become very difficult and the choking continued at intervals and the cyanosis did not abate. Adrenalin seemed to clear up the condition slightly, but, as the case was further observed, it was noted that they cleared in the same way without adrenalin and became worse as time went on. About an hour after the antitoxin was injected the lungs began to fill up and there seemed to be evidence of marked edema. Fluid could be heard in the trachea and the tracheotomy tube had to be cleaned every five minutes, finally every two or three minutes. Atropin was given. This helped control the marked secretion. The choking could not be ex-

plained in this case by compression of the trachea, as aëration through the trachea seemed to be very good. It must have been due to edema which was produced in the smaller bronchioles, which reflexly produces coughing and choking sensation. That is probably what happened, to a greater or less extent, in the other cases where we have had choking.

As the convulsions grew worse, chloral hydrate was tried by rectum. Perhaps it held the convulsions for a very short period. Three and one-half hours after the administration of antitoxin the patient died in a general convulsion.

This patient was *x*-rayed before operation and the thymus was reported negative. He had had several operations, including a tracheotomy, without any ill effect.

In considering the cause of death, the same things would have to be considered as in the previous cases. However, we were more at a loss to explain the cause of death in this case because he had not the slightest sign of toxemia. Autopsy showed a very large thymus of the type previously described—long, narrow, and thick. The pathologist said it was definitely enlarged. Dr. Hickey, who was present when the body was opened, said he didn't see how it could be possible to show this enlargement by the *x*-ray. He felt that a lateral view would have helped some, but doubted it.

In summing up I wish to point out that a baby that is born with an unusually large thymus may show very mild, local thymic symptoms from the start; that these symptoms may never attract attention until after the baby has had several colds; that these babies seem to be more subject to colds or infections; that repeated infections in a patient who may have only a moderate enlarged thymus and in whom no history of thymic symptoms is obtained may prove disastrous; that thymic death is not necessarily sudden; that *x*-ray is a very valuable asset in making a diagnosis, but is not necessarily final. Physical examination may show an enlarged thymus when the *x*-ray fails, and vice versa. The choking, in at least some cases, can be explained by a reflex condition produced by more or less edema in smaller bronchioles.

CLINIC OF DR. WILLIAM S. O'DONNELL

TYPHOID SPINE—ACUTE SPONDYLITIS FOLLOWING TYPHOID FEVER

THE girl whom I wish to present today has a very interesting condition, known as typhoid spine, an infectious spondylitis following an attack of typhoid fever. She appeared at the clinic today for re-examination. She was admitted to the hospital two months ago. She was brought to the hospital at that time by her parents on account of a severe pain in the lower back. The family and birth history contain nothing of importance. She has had measles, whooping-cough, and diphtheria, with good recovery. Two months before admission she had an infection which was from paratyphoid A. The illness lasted for five weeks. Her convalescence was uneventful. Ten weeks after this infection she was suddenly taken with a severe pain in her back. The pain was continuous and was present both day and night. She was consequently very weak and had to remain in bed. Her appetite was good. Her bowels were normal.

Examination.—She is very well developed and nourished for her age. On admission her temperature was 101.5° F., pulse 130, respirations 22. Her head is of good shape. The eyes, ears, and nose are normal. The teeth are in good condition. The tonsils are enlarged. The mucous membranes are of good color. The lungs and heart are normal. The abdomen is level and soft. The liver and spleen are not palpable. There are no masses felt. The genitalia, extremities, and skin show nothing abnormal. Her hip-joints are negative. In placing her in a prone position and raising her by the legs there was a rigidity of the spine. This movement would elicit the severe pain. There was a muscle spasm along the sides of the vertebræ in the lumbar region.

On entrance to the hospital a provisional diagnosis of lumbo-sacral arthritis was made.

Blood Examination.—Red blood-cells, 5,600,000; white blood-cells, 8200; hemoglobin, 85 per cent.

Differential Count.—Polymorphonuclears, 53 per cent.; large lymphocytes, 15 per cent.; small lymphocytes, 26 per cent.; mononuclears, 5 per cent.; transitionals, 1 per cent.

The urine is pale, acid; specific gravity 1.015, no albumin or sugar. The sediment is negative.

Fig. 179.—Typhoid spine.

The cutaneous and intracutaneous tuberculin tests are negative. The blood-culture is negative. The Widal is positive for paratyphoid A.

From the *x*-ray examination (Fig. 179) we have been able to make the diagnosis of typhoid spine. The *x*-ray shows the bony proliferation extending out from the third lumbar vertebra. There is also an accompanying spondylitis. There is no change in the intervertebral disk. This bony overgrowth is the typical bony change found in these cases, and it is from this evidence that

we are warranted in making the diagnosis of typhoid spine in this case.

Before considering this case further I would like to give a short review of the history of the disease. It may also be well to dwell on the prominent signs and symptoms, also the *x*-ray findings and the underlying pathology.

Spondylitis following infections by the typhoid group of organisms is not a common complication of typhoid fever. Until the *x*-ray came into use the diagnosis with the ensuing pathology was not definitely understood.

Gibney in 1889 first called attention to the stiff and painful back as a complication of typhoid fever, and stated that the process affecting the spine was an acute inflammation. Osler reported a similar condition in the spine, and mentioned the condition as being a neurosis. At this time no *x*-ray studies were available. Consequently the underlying pathology was not known. In 1906 McCrae first called attention to the definite pathology in this condition in 2 cases reported by him with the roentgenographic proof of the new bone formation which occurs in the typical typhoid spine. Since his report several other cases have been described. All cases show the characteristic changes in the spine.

The *x*-ray examination in all these cases shows the bony proliferation extending out from the lumbar vertebræ affected. This bony overgrowth is present in all cases, as has been demonstrated by the *x*-ray. There is also an accompanying spondylitis and periostitis. In some cases there is a destruction of the intervertebral disks. The bone proliferation may also be extensive and extend from one vertebra to the adjacent one. With this extension and the destruction of the intervertebral disk, an ankylosis results.

The pathology has been described from one case in which an autopsy was performed. This case was reported by Rugh. In this study it was seen that the intervertebral disk of the lumbar vertebra was missing and was replaced by a bony overgrowth that resembled the bony tissue of the vertebral bodies. Sections cut from this point for microscopic study show a com-

plete absence of cartilaginous tissue, and a very marked overgrowth of dense connective tissue which has a rich blood-supply. The connective tissue bridges the space normally occupied by the intervertebral disk, thereby causing a complete ankylosis.

The pain is the most prominent symptom and is always of a very severe type. It is not affected by the use of sedatives. Large doses of morphin give only temporary relief. The pain is present even though the patient is at complete rest. Any movement of the body aggravates the condition. The pain always occurs in the region of the lower lumbar vertebræ. This is the region that is affected in all cases. The pain may be transmitted along the course of the intercostal nerves, or it may extend down the legs. Lying perfectly flat on a hard mattress gives most relief to the patient.

The temperature elevation accompanied the course of the acute infection. In this child the temperature ranged from 100° to 103° F.

There may or may not be a leukocytosis. In this case the leukocytes were within normal limits.

The muscle spasm is present in all the cases. The spasm occurs in the long muscles of the back, along the vertebral column. This patient was unable to walk. This is due to the weakness following the long illness, also to movement of the body which brings on the pain. There is no atrophy of the muscles with the subsidence of the pain, and after a period of rest the patients are able to walk again.

The clinical course of this case is interesting. The temperature averaged from 101° to 103° F. the first five days in the hospital. The child complained incessantly about the pain. Sedatives were given in large doses. They only gave temporary relief and their effect wore off quickly.

In this clinic we have used foreign protein intravenously in the treatment of arthritis cases. The best results are obtained in acute cases. The injection of the foreign protein is accompanied by a chill, the subsidence of the fever, also a leukocytosis, the degree of leukocytosis depending on the severity of the reaction.

On the sixth day after admission this child was given 150,000,000 dead typhoid bacilli intravenously. She had a marked reaction and a leukocytosis of 20,000 at the height of her reaction. On the following day she had no pain and her temperature was normal, and neither of these symptoms reappeared. On the second day following treatment she felt strong enough to be in a wheel chair, and in one week she was able to walk. Her back was strapped to immobilize the spine, as we felt that this procedure would aid in preventing ankylosis.

The patient returns today, just two months after her entrance into the hospital. You can see by her general appearance how well nourished she is. Her appetite is excellent. She is able to go to school. Her *x*-ray examination at this time still shows the bony proliferation on the side of the third lumbar vertebra. However, there is no disk destruction. Consequently, as you see, she can move her back in all directions without pain and without any limitation of motion.

This is an excellent example of the so-called typhoid spine. The name does not exactly fit this case, as this is a paratyphoid infection, but the findings are the same as in the cases in which the typhoid organism is the cause.

The foreign protein therapy treatment of these cases has been tried before. Allen reports a similar case treated with foreign protein. He used typhoid vaccine and gave subcutaneous injections. His results were the same. The temperature subsided and there was immediate relief from the pain.

As there has been no extension of the bony proliferation and no destruction of the intervertebral disk in this child, we expect no further trouble from the condition, so we shall give a favorable prognosis to the patient and discharge the case from our care.

CLINIC NUMBER 4

CLINIC OF DR. D. MURRAY COWIE

THE GRADIENT IDEA IN THE VOMITING OF INFANTS

I AM presenting this case to you because I believe it illustrates very unusually well the gradient idea in the treatment of some cases of vomiting in infancy, perhaps all.

The story of the case runs as follows: A few days ago at 10 o'clock in the morning the father found the baby crying and very irritable. These symptoms continued until 12 o'clock, when she vomited. There was no blood in the vomitus. It seemed to contain nothing but mashed potato and fluid. The doctor was called. He tells us he found a ten-month-old baby vomiting and giving evidence of distinct pain in the abdomen. He further found that the baby had had repeated attacks of vomiting at irregular intervals from which she recovered easily. As the hours went by the vomiting became more severe and finally became projectile in type. No blood was seen in the vomitus or in the stools. After twelve or fifteen hours of persistent vomiting the doctor found a strangulated right inguinal hernia. This he reduced under chloroform with considerable difficulty. Following the reduction the baby was more easy, but the vomiting continued through the night and the following day. The baby was brought to the University Hospital soon (fifteen hours) after this.

The examination at this time was entirely negative. There seemed to be no pain on pressure at any point over the abdomen. We were unable to find any muscle spasms and no hernia was present. The right inguinal ring seemed to be the same as the left. Both were possibly slightly relaxed.

The patient was referred to the department of surgery. Operation was advised. As is our custom, a radiograph of the chest was taken prior to posting the case for operation, and an enlarged thymus was found. This is being treated by the *x*-ray.

On entering the hospital the baby was put on a formula, but she vomited all her feedings. Thinking this an admirable case, illustrating reverse peristalsis due to pinching of the gut, we put her on thick cereal, with the idea of heightening the gradient and starting peristalsis in the normal direction. She retained the cereal well and was put on our ordinary diet for an infant one year old. No further difficulty has arisen. She has gained but little in weight as yet. As she continued to manifest signs of irritability, she was given atropin sulphate, which overcame the condition promptly; so that now she no longer cries and seems more contented.

Thick cereal feeding is not a new procedure to the pediatrist. The explanation of its action in relieving vomiting, however, has not been clear until within quite recent years, particularly since the important observations of Alvarez on the physiology of the gastro-intestinal tube.

As early as 1883 Gaskell described the movements of sino-auricular, auriculoventricular tube. He showed quite conclusively that the sinus beats more rapidly than the auricle, and the auricle more rapidly than the ventricle. In other words, there was a distinct gradation downward in the direction of the blood-stream. To use his own words, "The rhythmic power of each segment of the heart varies inversely as its distance from the sinus."[1]

Along with the more recent work on the heart gastro-enterologists began to interest themselves in the possibility of similar mechanisms being at work in the gastro-intestinal tube, establishing its onward motion. Auerbach's plexus was the center of attention. Some of us hoped investigations in progress would prove that the intestinal movements were under its control. However, as investigation succeeded investigation, there developed what may now be called the myogenic school, as opposed to the neurogenic school, which had held that all movements of the digestive tube were under the control of the nervous system. The myogenic school, however, admits control by the nervous system, but not the chief or ordinary control.

[1] Gaskell, W. H., on the Innervation of the Heart, with Special Reference to the Heart of the Tortoise, Jour. Physiology, 1883, 43, 127.

Cannon in 1908 and, preceding him, Englemann in 1869, as well as others, have shown that the smooth or involuntary muscle found in tubular organs when stimulated in certain areas by mechanical, chemical, or electric means exhibits a ring of contraction from which waves run out in all directions. It was later found that in tubes which conduct fluid in a certain direction, while such stimulation produced waves or ripples in all directions, the longer waves were those flowing downstream, so to speak. It was with these interesting problems Alvarez, in particular, busied himself.

If pieces of stomach and intestine are excised and placed in Locke's solution, results analogous to those obtained from heart sections are produced. The sections continue to beat. On inspection it is easy to see that the sections from the duodenum, for example, beat more times per minute than those from the jujunum, ileum, and colon. In fact, in some animals it can be told which end of the section is orad (toward the mouth) and which is cecal.

Thus we see the stomach and the intestine have the ability to move in a rhythmic, propulsive manner without the aid of the central nervous system; indeed, it is now well known that the gastro-intestinal movements proceed in a normal manner after the nerve plexus has been severed.

In the cardiovascular system you are all familiar with the pacemaker, the sino-auricular node, the auricular node, and the auriculoventricular node. You are also familiar with the fact that the heart with the sinus may be removed from the animal body, placed in Locke's solution, kept warm, supplied with air, continues to beat for several days. In so doing it may utilize certain substances added to the Locke solution, glucose, for example. I speak of these phenomena to emphasize the fact that the central nervous system is not necessary for the movements. Probably under normal conditions and even under certain pathologic conditions it is not concerned with them.

We are then dealing with muscle—involuntary muscle and muscle tone. It is an interesting fact that pacemakers seem to be situated in soft tissues; as witness, the sinus and auricular

nodes. A certain area has been found on the lesser curvature of the stomach near the cardia which answers many of the requirements of the pacemaker. Its rate is very much faster than that of other areas of the stomach. From this area waves pass to the pylorus. So far as we know this area sets the pace only for the stomach rhythm, or gradient. Keith[2] has found tissue in this area at the cardia and at the ileocecal sphincter which he regards as nodal tissue, like he has found in the heart. Keith's theory is that there are zones or segments of the gastro-intestinal tube through which food is propelled by means of a pacemaker in each section. This, however, has not been proved.

It is certain, nevertheless, that each segment of the small intestine contracts "at its own rate" (Alvarez). The lower down we go, the slower the rate until the colon is reached, where the rate is so slow it may not be at once observed. In the transverse portion of the colon reverse peristalsis from the middle to the cecum is normal.

You may ask what has this to do with vomiting—with the case under consideration. Simply this: Experiment has shown that injury to the intestine, such as pinching, for example, brings about reverse peristalsis. The gradient becomes disturbed and waves pass upward as readily as downward, or they may pass equally in all directions. An ascending wave meets a descending wave from an upper zone and, I imagine, has an effect to stop or hinder its downward course. It has been shown that upward ripples initiated in the lower ileum may travel in the duodenum. The nausea of an appendicitis and the succeeding vomiting is due to a reverse peristalsis.

The next question that probably enters your mind is, well, what about it? How does this information help us in the treatment of vomiting, caused, as we think it has been in this case, by pinching the gut in the inguinal ring?

The question is answered by the actual experiment performed by Alvarez and his co-workers, and clinically demonstrated by many of us since our attention has been called to it. Certain foods, certain drugs, certain cathartics heighten the gradient, that is, raise the tone in the upper segments and starts a normal

wave downward. On the other hand, certain foods, certain drugs, and cathartics lower or flatten out the gradient so that the downward incline is less steep. The upper end, figuratively speaking, comes more nearly to the level of the lower end and the tendency to reverse peristalsis is increased.

It has been my custom for some time to take these facts into account in the postoperative treatment of abdominal cases in particular—the postoperative nausea and vomiting induced by too much handling of the gut as well as by the ether. The old custom was to purge our patients freely before operation. The early days of the war showed us our mistake in this respect. It was soon observed that soldiers operated at the front without the usual preparation given at some base hospitals had less distention and less nausea and vomiting. It then became the custom to avoid catharsis. We know by their use, with the exception of one (to date)—calomel—the gradient is flattened out, the intestinal tone is lowered. I am convinced that the liquids given to postoperative cases very frequently favor nausea and vomiting because they have little or no heightening effect on the stomach pacemaker, possibly because they are not retained in the stomach long enough. When we feed these patients thick cereal or more solid food, providing it is smooth, the nausea and vomiting in many cases quite dramatically ceases. This food has heightened the gradient. Normal peristalsis had overcome the antiperistalsis, and if all goes well after the food passes the pylorus the normal order is once more established. So we find it in the case before us. It might be stated at this point that atropin acts in a similar manner. It raises the tone, heightens the gradient; and may I further say that it raises it in excised bits of intestine away from the influence of the autonomic nervous system.

It is impossible to but barely touch the mines of interest and of knowledge that have been opened up by the investigations referred to. It would take several hours to cover the field of the newer physiology of the gastro-intestinal tract. Much of our information is still fragmentary. Nevertheless, many unexplained clinical findings have met their solution and many are substantiating experimental facts.

The next case is one I saw recently as an out-patient. A baby girl, ten months old, who was brought for consultation because of feeding difficulties, constipation, and occasional vomiting. She was slightly underweight, but physical examination revealed no further abnormality. The stools were the typical soap variety. Our first directions were for a formula suited to the baby's weight and age. While the bowel condition became better, as time went on she began to take only part of her feedings. Finally she refused to take them, and when she did, by encouragement, she almost invariably vomited them. Thick cereal was ordered, which she took and retained. As other foods seemed necessary, efforts to encourage her to take the formula were continued, but with no success.

This case probably illustrates the large group of vomiting cases we meet; those without any discoverable lesion which might be responsible for the reverse peristalsis. This baby, without any apparent reason, as I said before, refused to take milk. When he was urged to take it and did so, it was invariably vomited. Stomach analyses showed practically normal reactions. A food given after a stomach lavage was more likely to stay in the stomach than the other foods. In other words, the findings were not those so frequently found in pseudopyloric stenosis with spasm and hyperacidity. The baby would take thick cereal, but not with milk poured over it. So long as the milk was there, regurgitation and vomiting would ensue. There was no evidence of sensitization to milk. The vomiting immediately stopped when the baby was allowed to have thick cereal. I then ordered the cereal cooked in milk. In this way we were able to get sufficient milk into the daily food to satisfy the caloric needs and furnish the proper amount of the various food principles. This was the end of the trouble. Subsequently the baby was given various foods, vegetables, etc. He was fed as an infant one or more years old.

The exact cause of the reverse peristalsis in this case, of course, cannot be determined. We know from experiment indigestible substances, such as cellulose from certain foods, may produce enough irritation of a bowel segment to induce upward waves.

This, however, did not occur in the case under consideration. We are all familiar with nausea and vomiting from swinging, the rocking of a boat, from spinning in a nystagmus chair, from witnessing a revolting sight, from a disagreeable odor, etc. I have a patient whom I have watched for years, who is an indefatigable worker, who manifests none of the ordinary signs of the gastropath, but who, for example, at the sight of a fly in a glass of milk, or a hair in her food, is seized almost immediately with marked vomiting and retching. I need not multiply examples of this kind. You are all familiar with them. That nausea and vomiting which is associated with a sensitized vertigo is of vestibular origin—the others are not. The swinging, spinning, and rocking results are probably of the vestibular origin. The others are psychic phenomena. The gastro-intestinal tube is peculiarly susceptible to the influence of psychic stimulations. Just how they operate I am not able to say. Another cause of reverse peristalsis is illustrated in the nausea and vomiting accompanying various infections in children. The cause in this group we consider of a toxic nature. Anything that would lower the tone of the gastro-intestinal muscle flattens out the gradient and makes reverse peristalsis more likely to happen.

It has been shown that there is a metabolic gradient as well as a rhythmic gradient. The metabolic rate is greater in the sections of muscle that beat the fastest. If bodily conditions are such as to hinder we may say the normal respiratory exchange in the muscle, the muscle tone, must, of necessity, be lowered. This is easily demonstrated in the ordinary intestinal strip test for epinephrin, for example. The strip will stop beating and the lever to which it is attached will stand still very soon after you remove the tube that bubbles air through the Locke solution in which the strip is bathed. As soon as oxygen or air is supplied it again proceeds at its normal rhythm.

One who has seen much of fluoroscopy of the alimentary canal is familiar with the akinetic stomach brought about by fatigue. When waves do not pass from the cardia to the pylorus one must not too quickly make a diagnosis of an akinetic stomach. If the patient is asked to sit down for a few minutes this short rest will

often show that the failure of the waves to pass in the normal manner was due to fatigue. In other words, the akinetic condition in such a case is at least not constant. Fatigue is a fruitful cause of gastro-intestinal upsets, particularly in adults.

So we see there are many things that may be at work that are not necessarily anatomic lesions, such as ulcers, adhesions, etc., that may be conducive to reverse peristalsis and its symptoms.

The so-called law of the intestines (Bayless and Starling) which has firmly fixed itself in the minds of many pediatrists does not always seem to fit into our line of thought, though it is not entirely divorced from it. Alvarez calls attention to the fact that it is not an easy thing to demonstrate, and makes a comment to the effect that such an important function, if it is the true mechanism of food propulsion, should be more easily and more uniformly demonstrated. The gradient idea—or law—in other words, is very much more easy of demonstration. It is a constant phenomenon.

The second case may well illustrate a lowered gradient brought about by distaste for food, or it may be the result of some low-grade infection, or it may have been initiated by improper feeding which brought about the impaction of hard feces we found in the rectum on our first examination. Conditions in the lower rectum and in the anus, such as fissures, are frequent causes of reverse peristalsis. Care must be taken not to take a dogmatic position on matters of this kind. While evidence in favor of the gradient idea in nausea and vomiting is very convincing, there are still many things to learn and many contradictory results to explain or straighten out.

One more case taken from my private records, Nancy M., seven years old, entered my private hospital June 10, 1921. She gave a characteristic history of cyclic vomiting attacks which had occurred from her second year. They were quite severe and recurred about every two or three months. The temperature, in some attacks, would register as high as 102° F. This, however, was not the rule. The attacks would last from four to five days. During this time she was unable to hold water on her

stomach. The bowels were normal between attacks, but no movements occurred during the attacks.

She was brought to the hospital for tonsillectomy. After the operation (ether anesthesia) she vomited not unusually, but did not stop. A severe cyclic attack had been initiated which continued for several days. The pediatrist in charge of the post-operative care treated the case in the usual manner. As things did not improve, Miss King, the nurse in charge of the hospital, tried the effect of solid food. The vomiting stopped immediately and did not recur. This may be offered as an illustration of reverse peristalsis induced by the principles involved in the production and continuance of this interesting malady, cyclic vomiting, which, so far as we know, has no definite anatomic basis unless perhaps it is a lymphoid appendix.

CLINIC OF DR. ROY M. GREENTHAL

SPLENIC ANEMIA OF HYPOPLASTIC TYPE IN A BREAST-FED INFANT

History.—Baby W. M., aged five months, was admitted to the Pediatric Department of the University Hospital July 15, 1921. The chief complaint was lack of color and failure to gain weight.

Family History.—The mother and father are living and well. The father's first wife died of diabetes. The father has 2 sisters who have been treated for "anemia." There is no history of tuberculosis or lues.

Birth History.—The baby was full term, with instrumental delivery. There was no trauma or cyanosis. The birth weight was 6 pounds.

Feeding History.—The baby has been entirely breast fed every two or three hours. No other food has been given.

Past Illnesses.—Two weeks before admission the infant had loose stools for one week. The stools were green in color and there were four or five a day. No blood was noticed.

Present Illness.—Since the diarrhea the mother has noticed that the baby seemed paler. The lips were somewhat blue. The infant seemed listless. He has not gained weight for the last two weeks. Before this he had gained 6 to 8 ounces each week.

Examination.—The patient is a fairly well-nourished and developed infant, weight 10 pounds, 12 ounces. He seems fairly vigorous and has a strong cry. The striking thing about his appearance is the intense pallor of the skin and mucous membranes.

Head.—Normal in size and shape. The anterior fontanel is level. There is complete absence of the hair over the occipital region.

Eyes.—The pupils react to light. The conjunctivæ are pale.

Ears.—The drums are normal.

Nose.—No discharge.

Mouth.—There are no teeth. The tongue is clean. The mucous membranes are very pale. The throat is not inflamed.

Neck.—There is no rigidity or retraction.

Thorax.—There is a slight rachitic rosary. The apex of the heart is in the fourth intercostal space, 2 cm. outside the nipple line. The rate is rapid, the sounds are clear and distinct. There is a soft blowing systolic murmur heard best over the pulmonic area, and not transmitted to the back or axilla. The lungs are clear throughout.

Abdomen.—There is a slight distention. The liver edge can be felt 4 cm. below the costal margin in the right nipple line. The edge is rather sharp and firm. The spleen is palpable 3 cm. below the costal margin in the left nipple line. The edge is firm and hard.

Genitalia.—There is a slight phimosis. Both testicles are descended.

Extremities.—There is no paralysis or spasm.

Glands.—There is moderate enlargement of the axillary, inguinal, and cervical glands.

Reflexes.—There is no abnormality of any of the reflexes.

Skin.—Aside from the intense pallor, the skin is normal. There is no loss of elasticity.

Laboratory Findings.—Blood Wassermann negative. Tuberculin test negative. Urine negative for albumin, sugar, casts, and pus-cells.

Blood-picture.—Red blood-cells, 2,200,000; hemoglobin (Sahli), 27 per cent.; white blood-cells, 10,000.

Differential Count.—Polymorphonuclear neutrophils, 10 per cent.; polymorphonuclear eosinophils, 2 per cent.; large lymphocytes, 15 per cent.; small lymphocytes, 70 per cent.; neutrophil myelocytes, 3 per cent.

There were 15 nucleated red cells seen in counting 300 white cells. The blood-platelets appeared markedly diminished. The red cells showed marked anisocytosis, many microcytes and macrocytes were seen.

Diagnosis: Splenic anemia; rachitis.

Progress.—The infant was nursed every three hours for

fifteen minutes. It was found that he only received about 2 ounces with each feeding. An analysis of a composite sample of breast milk showed the fat percentage to be 2.5 per cent. The total solids were low. The following complemental formula was ordered: Milk, 20 ounces, water, 11 ounces; dextrimaltose, 1 ounce; 4½ ounces after each nursing. The infant took the milk formula very poorly.

On July 16th, 17th, and 21st the infant received 10 c.c. of whole fresh blood intramuscularly. The donor was the father.

The blood injections caused a striking change in the blood-picture. There was a marked stimulation of the bone-marrow as evidenced by the large number of nucleated red blood-cells and platelets. The percentage of polymorphonuclear neutrophils was also increased.

Blood-picture (July 26, 1921).—Red blood-cells, 2,800,000; hemoglobin, 35 per cent.; white blood-cells, 39,400.

Differential Count.—Polymorphonuclear neutrophils, 42 per cent; polymorphonuclear eosinophils, 5 per cent.; small lymphocytes, 27 per cent.; large lymphocytes, 13 per cent.; transitional forms, 4 per cent.; neutrophilic myelocytes, 9 per cent.

In counting 300 white cells, 56 nucleated red blood-cells were seen. There are large numbers of blood-platelets present. The appearance of the red cells is about the same as before.

The infant was discharged July 26th and the blood injections were continued by the family physicain.

August 29, 1921 (letter from the home physician): The child has received eleven injections of blood from the father, making a total of 110 c.c. of blood given over a period of one month. His weight has remained stationary due to the fact that he will not take much of the formula. His general condition seems much improved and his color is better. On August 19th the white blood-count was 60,000. The hemoglobin was 50 per cent. (Sahli). There is no change in the size of the spleen.

We advised the physician to discontinue the blood injections, to wean the baby from the breast at once, to give iron in the form of ferrous carbonate saccharated, 3 grains t. i. d., and to begin orange juice and cod-liver oil.

January 19, 1922 (letter from the home physician): The child is now ten months old and weighs 17 pounds. He has gained 7 pounds in five months. His general condition is excellent. His color is good. The spleen is still palpable, but smaller and softer than before.

Blood-picture.—Red blood-cells, 4,800,000; white blood-cells, 9400; hemoglobin 87 per cent. (Sahli).

The examination of the stained smear shows no nucleated reds or myelocytes.

Comment.—Severe anemias are sometimes seen in young breast-fed infants. There is usually some enlargement of the spleen, but it is not always present. The blood-picture is of the hypoplastic type, characterized by a marked diminution of polymorphonuclear cells, usually a leukopenia, and a diminution in blood-platelets. There is a diminished bone-marrow activity, but there is no true aplasia, as the bone-marrow can be stimulated by various means, such as injections of blood, horse-serum, typhoid vaccine, etc. The study of the blood before and after the injection of foreign protein would seem to offer a means of roughly estimating bone-marrow activity, and some idea of the outcome of the case can be gained by such a procedure. Recently a girl of six years with severe anemia was seen. The blood-picture was that of an aplastic anemia. After the intravenous injection of a small amount of typhoid vaccine there was no change in the blood-picture. No new formed cells were seen. An unfavorable prognosis was given and the child died a few months later.

In this case the intramuscular injection of blood acted as a foreign protein and caused the appearance of large numbers of new formed cells in the blood-stream. It also served to supply hemoglobin to the body. The increase in newly formed cells from the bone-marrow caused the remarkable change in the blood-picture, *i. e.*, increase in the total number of white blood-corpuscles, nucleated red cells, and blood-platelets.

The etiology of the severe anemias in breast-fed infants is not clear. In all of our cases the mother's milk was very scanty at the time of examination. The percentage of fat and total

solids was very low. These infants were persuaded to take cow's milk with great difficulty, although they were getting practically nothing from the mother. In one patient gavage was necessary for two weeks. Either the fault is in the mother's milk or there is a deficient supply of iron in the tissues and the reserve is exhausted early. The later view would seem more logical, for we know that a baby should have enough iron in his body for the first nine months even though he gets very little in his food. Neither human milk nor cow's milk supply sufficient iron after the first year.

The treatment of this form of anemia consists in weaning the baby at once if he is not receiving sufficient calories. Mixed feeding has not seemed very satisfactory. Iron should be given by mouth in the milder cases. In the severe cases either a transfusion or intramuscular injections of blood can be given. The ultimate outcome has been very good in all of our patients.

CLINIC NUMBER 5

CLINIC OF DR. D. MURRAY COWIE

A CASE OF HODGKIN'S DISEASE DEVELOPING IN A GIRL OF NINE YEARS—LIVING AND IN EXCELLENT HEALTH AFTER SIX YEARS OF *x*-RAY TREATMENT

HODGKIN'S disease has been looked upon as a hopeless affair. The average patient lives, as a rule, not more than two or three years. The patient I present is one I have shown in the clinic each year for the past five years. There is nothing for you to see today except a bright girl of fourteen years and discoloration of the skin which I will refer to later. There is one small cervical gland palpable. She is strong, though a bit slender. She enjoys the active life of a girl of her years. She is in the ninth grade in school.

I show the case again to illustrate what may occur when there is complete co-operation between patient, family, and physician, and when the case is carefully followed and treated by the *x*-ray method to the exclusion of everything else. For a time during the first year Blaud's pills were given with the idea of helping the secondary anemia.

The case, as will be seen from the record I present to you, was one of marked degree, involving the cervical and intrathoracic glands.

Helen S., aged fourteen, entered the clinic first January 16, 1918, when she was nine years old. She is now fourteen. In April, 1917 her parents first noticed enlargement of the cervical glands on both sides. They were not very large, but noticeable. By October of the same year these had increased to "bunches" the size of the end of a finger. The bunches were larger on the left side. They had never been red or tender. There had been oc-

casional fever and a non-productive cough. She had lost but little weight. She had had some medicine, but no local applications. Otherwise the child was well and happy.

The family and past histories are negative. It might be well to mention that she has been fairly free from infections. She had whooping-cough at six years. No other contagious diseases or acute illnesses, seldom sore throat or head cold. Lately she has complained of her knees and legs aching. She sleeps well. Her appetite is good. Her bowels are normal. She goes to school and is in the seventh grade. She weighs 68 pounds.

Physical Examination (on entrance, 1/16/17).—Somewhat slender form, fairly well-developed musculature. The panniculus is moderate in amount. There is a certain pigmentation of the skin, which amounts to a bronzing particularly in the axillæ, over the shoulders, and the midline of the abdomen.

Head.—Circumference 50.2 cm., negative. *Eyes*, *nose*, *ears*, and *mouth cavity* negative.

Neck.—Marked thickening at the base due to collection of discrete glands which come up from beneath the clavicle, varying in size from the end of a lead pencil to one situated on left side the size of a walnut. The glands are not attached to the skin. They are freely movable. The large one is slightly tender to manipulation. These glands do not extend upward beyond a line drawn at the level of the thyroid cartilage. The post-auricular, tonsillar, and posterior cervical glands are not enlarged. Thyroid is negative.

Chest.—Circumference 62.3 cm., fairly well formed, symmetric. Breast development beginning. Axillary glands are not enlarged. Epitrochlears and inguinals negative.

Lungs.—Positive D'Espine down to third dorsal. Otherwise negative.

Heart.—4 x 9 cm., negative.

Abdomen.—Negative except for a yellow discoloration mentioned above.

Extremities.—Scapulæ and shins straight—negative.

Genitals negative.

Reflexes negative.

Glands.—As described above—cervical and intrathoracic glands enlarged, others negative.

Laboratory Findings.—Blood Wassermann negative. Von Pirquet tuberclin negative. Urine negative.

Blood.—Leukocytes, 15,700; small lymphocytes, 14 per cent.; large mononuclears, 17.5 per cent.; polymorphonuclears, 66.5 per cent.; transitionals, 1 per cent.; eosinophils, 1 per cent.

Pathologic (1/17/18).—Small gland above the left clavicle removed for examination under local anesthesia. Report returned: "Atypical." January 22d other and larger glands were removed under general anesthesia. Pathologic report on these glands: "The glands present the appearance of Hodgkin's, with large areas of necrosis. Has the patient been *x*-rayed?"

Clinical and Treatment Observations.—*Fever.*—While in the hospital temperature varied between 98° and 102° F. Pulse varied between 80 and 122. Respirations varied between 22 and 30.

Radiograph Reports and *x*-Ray Treatment Dates.—1/24/18: "The superior mediastinum contains a large, discrete, well-defined mass on either side of the trachea and causing no compression and practically no displacement. An extension on the left reaches over the anterior surface of the pericardium. The mass is bossilated and sharply circumscribed. From our point of view, Hodgkin's or lymphosarcoma. No evidence of tuberculosis within the thorax" (J. G. Van Zwalewenburg).

1/24/18: *x*-Ray treatment.

1/28/18: *x*-Ray treatment.

2/26/18: "The chest shows marked improvement, nearly the whole of the mediastinal mass having disappeared, or at least having been reduced to a very small fraction of its previous size. It is still marked at the right margin extending from the level of the first rib through the posterior mediastinum to the level of the eighth spine. On the left side the heart appears to be double contoured, apparently from the presence of a thin layer of pathologic tissues conforming almost exactly with the shape of the heart, a sort of envelope. The B. V. tree on the right side shows distinct changes. The trunks are more numerous

than usual and more nearly rectilinear and extend nearly to the periphery of the lung. We imagine this is the result of pressure in the hilus" (J. G. Van Zwalewenburg).

2/26/18: *x*-Ray treatment.

5/16/18: "In comparison with the previous plates, No. 4091 shows an identical picture. There is still a slight fulness along the right side of the upper mediastinum. There is no appreciable difference in its extent" (J. G. Van Zwalewenburg).

5/16/18: *x*-Ray treatment.

11/20/18: "Careful comparison with the previous plates shows that the mediastinal condition is quite as good, if not better, than at the last examination on May 15th. There is still a slight prominence to the left along the descending aorta, the superior and anterior mediastinums appear to be entirely free. Diagnosis as before" (J. G. Van Zwalewenburg).

11/20/18: *x*-Ray treatment.

6/11/19: "In comparison with the previous plates we are led to believe that the condition of the mediastinal mass is improved over that in the last plate (last plates taken November 20th). There is less displacement of the heart, the mass does not extend as far upward, apparently smaller laterally than at that time. Diagnosis as before" (J. G. Van Zwalewenburg).

6/11/19: *x*-Ray treatment.

10/8/19: "Comparison with previous plates shows almost complete disappearance of the mediastinal mass, it being represented only by a slight widening of the aortic shadow with the addition of a narrow shadow on the right side and sharply circumscribed externally. Diagnosis, small residual mass—Hodgkins" (J. G. Van Zwalewenburg).

10/8/19: *x*-Ray treament.

1/9/20: "As compared with the first examination there is a decrease in the width of the pathologic area of 1 inch in the mediastinum. As compared with the last examination the shadow in the right mediastinum is probably a little less dense. Otherwise no change" (J. G. Van Zwalewenburg).

1/9/20: *x*-Ray treatment.

5/21/20: "The apices are clear, costophrenic angles free,

parietes negative, hilus and B-V shadows not remarkable. Heart is normal in size, shape, and position. The interest in this case, of course, attaches to the mediastinum. There is a long series of previous plates, showing various degrees of change in the process. As compared with the last plate, there is distinct improvement. At present there is a small amount of density left just on the right side of the sternum, just below the arch of the aorta, in relation to the sixth rib behind. The glands at present affected appear to lie wholly in the posterior mediastinum behind the upper portion of the cardiac shadow. As compared with the first plates in this series, of course, the improvement is striking and remarkable. In the present plate the upper mediastinum is nearly clear. Diagnosis as before" (J. G. Van Zwalewenburg).

5/21/20: *x*-Ray treatment.

12/8/20: "Re-examination at our request, including a lateral flat plate of the thorax. These are all excellent plates. The P-A stereo in the usual technic shows no remaining evidence of any previous pathology. The chest, including the mediastinal shadows, appears absolutely normal. The lateral plate is exceptionally good, shows the heart and great vessels as well as the anterior and posterior mediastinum in excellent detail. We see no evidence of any vascular thickening or enlargement on this plate. This plate might be used as a study of the anatomic thorax for this age. Examination negative" (J. G. Van Zwalewenburg).

12/8/20: *x*-Ray treatment.

7/22/21: "Examination shows the mediastinum now free from shadows, without any scars or evidence of the shadows previously demonstrated. The apices are clear. The costophrenic angles are free. The hilus shadows are not conspicuous. The heart is normal in size, shape, and position. Dr. Van Zwalewenburg has reviewed these plates, and he is of the opinion that this mediastinum is clear. Examination negative" (Dr. Donaldson).

I will not take up time to detail the physical findings noted as the case progressed. I will simply say that the palpable glands

disappeared about the first of April, 1918, which was two and a half months after the first *x*-ray treatment. D'Espine's sign was within the normal range at this time. In one year and three months the radiographs show that the chest was almost completely free from the mass described at first. One year later (12/8/20) the chest was completely clear so far as we are able to tell by this method of examination, since which time there has been no recurrence.

Examination today (1/22/23) is negative. The patient returned because they thought they found a gland in the neck. This proved to be a tendon.

Dr. Hoag has completed his observations on the 2 cases of familial corpus striatum disease, and will give his final report this afternoon.

CLINIC OF DR. LYNNE A. HOAG

FAMILIAL CORPUS STRIATUM SYNDROMES

CASE REPORT

An intensive clinical and pathologic study of the numerous types of disturbances of tonus, motor function, and co-ordination occurring in children has made possible a broad division of "paralysis of cerebral origin" into pyramidal and extrapyramidal groups. Due to the extremely variable symptoms a confusing number of clinical names have been suggested, many of which are merely descriptive of symptoms and signs. This confusion has had the tendency to discourage attempts at differential diagnosis, and to cause the classification of all cerebral palsies of children as essentially hopeless. Although localization may not help much from a therapeutic viewpoint, accuracy of prognosis can be much improved by a differentiation of the pyramidal and extrapyramidal lesions.

The pyramidal group of cases shows the usual complex of spasticity and palsy, hemiplegic or paraplegic, muscle spasm and resulting contractures, increased tendon reflexes, and often a positive Babinski. The extrapyramidal lesions may present a confusing variety of neurologic signs, but during the last few years a particular class of symptoms has come to be associated with lesions of that portion of the basal ganglia designated by the term "corpus striatum," which includes the caudate nucleus and the lenticular nucleus, with its subdivisions, globus pallidus and putamen. The functions most generally interfered with are co-ordinated or associated movements, muscle tonus, and speech.

Anton[1] in 1895 reported a case of double athetosis, with lesions of the putamen. Since 1911 C. Vogt and her associates [2, 3, 4] have been especially active in advancing our knowledge

of the pathology and symptomatology of corpus striatum cases. C. and O. Vogt[5] in 1920 published a very elaborate pathologic and clinical classification of these lesions. Wilson's[6] classical monograph in 1911 on progressive lenticular degeneration associated with cirrhosis of the liver gave impetus to the study. The papers of Hunt,[7] Taylor,[8] Thomas,[9] Thomalla,[10] Spiller,[11, 12] and Thermitte[15] should also be consulted if a more complete list of bibliography is desired. Recently B. Crothers[13] has emphasized the importance of these syndromes for pediatricians by a review of the literature, a summary of the anatomic and physiologic principles, and a presentation of illustrative cases.

Wilson[14] has shown that stimulation of the corpus striatum failed to produce any motor manifestations comparable to those produced by stimulation of the cortex, and also that destruction of the corpus striatum in apes did not reproduce clinical syndromes usually associated with such lesions in humans. Spielmeyer has recently published work tending to show that the lesions underlying the so-called corpus striatum syndromes are not confined to these structures and cannot be regarded as system diseases. The results of these two workers show that caution must be used in accepting the elaborate classifications put forward by C. and O. Vogt.

From a pathologic point of view there have been many types of lesions described as affecting the corpus striatum—hemorrhage, pseudosclerosis (Westphal-Strümpell), gliosis, and degenerations, the latter showing some specificity for either the large nerve-cells (paleostriatum) or the small nerve-cells (neostriatum). Elaborate attempts have been made to associate certain symptom groups with lesions in definite areas of the corpus striatum, as lenticular nucleus in Wilson's disease, caudate and putamen in Huntington's chorea, and pallidum in paralysis agitans. There is so much overlapping that further details would be beyond the scope of a clinical demonstration.

From a clinical point of view the working classification of B. Crothers[13] seems to be most distinct and conservative.

1. Double athetosis—choreiform or athetoid movements, disturbance of associated movements, difficulty in speech; rel-

atively slight or no rigidity, no disturbance of reflexes. It usually starts soon after birth or in early childhood, and may progress very slowly. Two cases in the same family have occasionally been noted. The small neostriatal cells are chiefly involved.

2. Juvenile paralysis agitans—extreme rigidity with tremor without athetosis. It is progressive and leads to helplessness. The large motor cells of the paleostriatum are affected.

3. Wilson's disease—rigidity, tremor, and occasionally choreiform movements or tonic spasms, cirrhosis of liver. It shows a remarkable family incidence, is progressive, and leads to death in a few years. The lesion is a degeneration of the lenticular nuclei involving both the neostriatum and paleostriatum.

4. Dystonia lenticularis—variety of athetoid and bizarre movements accentuated by marked variations in tonus in different muscle groups, this frequently leading to permanent deformities, such as "dromedary back." Thomalla[10] showed changes in the putamen and liver.

Many cases show distinct overlapping between these clinical groups, and, in addition, some of these extrapyramidal symptoms may occur with true cerebral spastic paralysis of pyramidal origin, denoting a simultaneous involvement of the two systems. This is to be expected when we remember the close proximity of the affected areas and their common blood-supply.

Disregarding for the moment the conflicting experimental data, the overlapping clinical syndromes, and the variability in character and extent of the pathologic lesions, we may cull from the literature the following apparently justified ideas bearing on the function of pyramidal and extrapyramidal systems. These have been particularly well summarized by Walshe,[16] who points out that co-ordination is not a function of the cerebral cortex, because the reflex reactions of decerebrate and spinal animals are co-ordinated, probably by the bulbospinal level. Certain large simple movements requiring many muscles, such as maintenance of posture, are performed in a co-ordinated manner, and destruction of these basal extrapyramidal systems results in disorders of movement, but not loss of voluntary power. On the other hand, the function of the cerebral cortex

(pyramidal system) is to analyze these large and simple movements and to pick out from them such fractional elements as are needed for voluntary purposive movements. Hence destruction of the motor cortex or its projection path produces loss of voluntary power, but releases lower level extrapyramidal reflex mechanisms which can still produce the simple reactions noted above.

The presentation of these 2 cases, unaccompanied by pathologic data, is undertaken because of the opportunity afforded to emphasize again the importance of distinguishing corpus striatum lesions, and because of the family incidence.

CASE REPORT

Family History.—Parents Austrian born, living and well, no evidence of neurologic lesions. Three children died before the age of one year from acute infections. Of the 4 living children, the 2 boys show the syndromes presented later; the 2 girls have, according to their history, no neurologic disturbances. The parents are not blood relatives, and know of no nervous diseases in either of their families.

Case I.—Andrew S., admitted to the hospital 8/16/21, male, aged four years. He had a normal birth and nutritional history. The first teeth appeared at about eight months, he walked at sixteen months, and said words at two years. At the age of three years he began to fall easily, speech became jerky and irregular, and later almost impossible. He was unable to sit still and the peculiar movements of head and hands gradually progressed. He dropped objects and was clumsy, but has continued to feed himself. He had not walked much in the two or three months previous to admission.

Medical Examination.—An underdeveloped and undernourished male child with purulent nasal discharge, large reddened tonsils, and moderate cervical adenitis. Percussion of the chest gives normal resonance and no râles are heard. The heart is not enlarged and auscultation reveals no murmurs. The liver and spleen are not palpable.

Neurologic Examination—Mental State.—He does not notice surroundings, but takes in his hands objects offered, cries when hurt, attempts to repeat words.

Motor State.—When undisturbed he lies perfectly still or quiet. Sits in a corner of the crib, showing disinclination to voluntary movements. In this condition the muscles show distinct hypotonia. When he is disturbed or attempts to perform voluntary motion there is induced a hypertonia of various muscle groups, altering in intensity and accompanied by peculiar coarse, irregular movements of head, tongue, and arms. Usually the extensor groups predominate over the flexors and the extremities are rigidly extended for short periods of time. At other times he shows backward position of head, extension of spine, and hyperpronation of the hands in a manner suggesting Sherrington's decerebrate rigidity. When these temporary rigidities do not develop, voluntary motions produce athetotetanoid movements of the extremities, particularly the upper. At times these simulate the quicker type of choreiform motions. He does not show movements which could be interpreted as a tremor.

Station and Gait.—Cannot stand or walk alone. Head is usually forward on chest, can be raised, but snaps back when released.

Pupils round, equal, regular, react to light. No paralysis of cranial or spinal nerves demonstrable. No localized muscle atrophy found.

Reflexes.—Biceps and triceps present, weak, but equal; patellar and Achilles' jerks equal and normal. Plantar irritation causes plantar flexion. Abdominal, cremasteric, and gag reflexes normal.

Fundus examination shows no gross pathology.

Laboratory Findings.—Roentgen ray of skull after subdural injection of 40 c.c. of air by lumbar puncture shows no evidence of hydrocephalus or other recognizable pathology. *Roentgen ray* of abdominal viscera after inflation of peritoneal cavity with CO_2 shows all viscera to be normal in position and normal in size with the exception of the liver, which seems definitely small,

but data for accurate judgment are not available. *Roentgen ray* of lungs shows no pathology.

Urine and *blood* normal; Von Pirquet *tuberculin* negative; blood and spinal *Wassermann* negative.

Course.—During a stay of two months the patient showed no significant change in symptoms. Before discharge he was sup-

Fig. 180.—Andrew S., four years. Shows rigidity, hyperpronation of hands, blurring due to athetoid movements.

ported and a photograph taken (Fig. 180), which shows blurring due to the athetoid movements, the forward position of the head, induced rigidity in the extremities, and hyperpronation of the hands.

A letter from the father in December, 1922 (fourteen months after discharge) said that the patient's general condition is

slightly improved, but his "nervous symptoms" are about the same.

Case II.—Adam S., brother of Andrew S., entered the hospital 10/6/21, aged nine years. He had a normal birth and feeding history, held up head at seven months, walked at sixteen months, and said simple words at nineteen months. He played normally as an infant, but stumbled and fell rather easily. He started in school at the age of seven years, but learned very slowly. His temperament was peculiar and made him the butt of his playfellow's jokes. At the age of two years he had a severe cough, fever, dyspnea, and "fits" with cyanosis.

Two years ago (age seven) his hands began to shake when attempting to tie his shoestrings or to reach for objects. This has shown a slow progression since that time. He drops objects easily, speech has degenerated, and a peculiar gait has developed. He has shown no progress in school during these two years. The only symptoms of which he has complained are occasional headaches and dizziness.

Medical Examination.—A tall, slender, poorly nourished boy of nine years, normally shaped head, normal nose and ears, tonsils moderate in size and slightly cryptic. The lungs show no pathology, the heart is normal in size, and no murmurs are heard. The liver and spleen are not felt. There is a very slight scoliosis in the middorsal spine.

Neurologic Examination.—The patient can walk, notices surroundings, obeys simple commands and attempts speech, but it is practically unintelligible. His face occasionally shows an emotionless grin.

Posture.—Can stand alone, head is held down on chest, arms semiflexed and held away from body. *Gait* is irregularly staggering, on one occasion propulsive for about eight or ten steps.

Motor State.—Tone of muscles is quite normal when relaxed and lying down. When excited or when doing voluntary movements there are variable rigidities in different muscle groups, and a coarse tremor of the hands and occasionally of the head is induced by volitional inations. Bilateral athetoid movements are

also seen, the tremor and athetosis sometimes alternating in the same muscle groups. The tongue shows bizarre movements almost choreiform in nature. There is no evidence of cranial or spinal nerve palsies.

Reflexes.—Biceps present, equal and normal; patellar and Achilles' jerks equal and normal. Plantar irritation causes in-

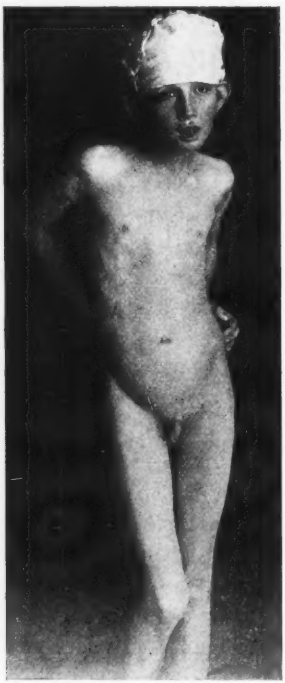


Fig. 181.—Adam S., nine years. Shows tongue in one of its bizarre movements; head bandage irrelevant.

definite dorsal extension of small toes, no reaction in great toes. Superficial reflexes normal.

Fundus examination shows no gross lesions.

Laboratory.—Roentgen ray of skull after subdural injection of air by lumbar puncture shows no evidence of hydrocephalus or other recognizable pathology. *Roentgen ray* of lungs negative.

Spinal fluid normal; *Wassermann* negative on blood and spinal fluid; *blood*, normal cells and hemoglobin; Von Pirquet skin *tuberculin* negative; *urine* normal.

Course.—During the patient's stay of two weeks no change was noticed. A photograph (Fig. 181) shows the tongue in one of its bizarre movements, but fails to show any other of the peculiarities of his motor system. A letter from his father in December, 1922 says that there has been practically no change since leaving the hospital (fourteen months).

In a family without other evidence of neurologic disease are 2 boys with disturbances of associated movements and muscle tone and speech, also odd types of athetosis and tremor and choreiform movements, all of these unaccompanied by palsies, true spasticity or increased tendon reflexes. The younger child showed more marked changes than the older, the essential things being distinct fluctuations in muscle tone, athetosis, inability to stand or speak. The essential findings in the older one were intention tremor, evanescent rigidities, athetochoreiform movements, and speech disturbance.

It seems permissible to assume that the lesions causing these syndromes are extrapyramidal because of the normal tendon reflexes and the lack of spastic palsies. The location is probably in the corpus striatum, but an attempt to localize more closely the position of the lesion is too risky. Although it might be interesting to assign these cases to one of the four clinical groups outlined previously, they are indefinite enough, so it is a difficult and uncertain task. The familial incidence might suggest Wilson's disease, but neither one showed any continuous rigidity and have thus far had very slow progression. The *x*-ray evidence for a small liver is too uncertain to permit of its use. The age at which the process is developing and its slow progress favor to some extent double athetosis, and the family incidence is not incompatible with this. The involuntary movements were not bizarre enough to suggest dystonia lenticularis, neither were there deformities. Juvenile paralysis agitans would scarcely be considered because of the lack of marked rigidity, the presence of athetosis, and the comparatively long duration (three and a half years).

Summary.—In general the corpus striatum syndromes are characterized by being purely motor, not paralytic, and are concerned with muscle tone, and voluntary, automatic, and expressive movements. Perhaps the most fundamental feature is a peculiar muscular rigidity unlike the hypertonus accompanying pyramidal tract lesions. It is the cause of the peculiar attitudes and the paucity of voluntary movements. Of equal importance are the involuntary movements which may be either of the tremor, choreiform, or athetosis variety, the particular one present perhaps depending on the state of muscle tonus.

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